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DIESEL PROGRESS, for June, 1946. Volume XII, Number 6. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 W. Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: $5.00 per year, single copy, 50c.

DIESEL and GAS ENGINE PROGRESS

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FRONT COVER ILLUSTRATION: International Diesel tractor equipped with ½-yard dozer shovel stripping over-burden in a clay mine near Castle Rock, Colorado. Product used in brick, tile and pottery.

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Assistant Editor

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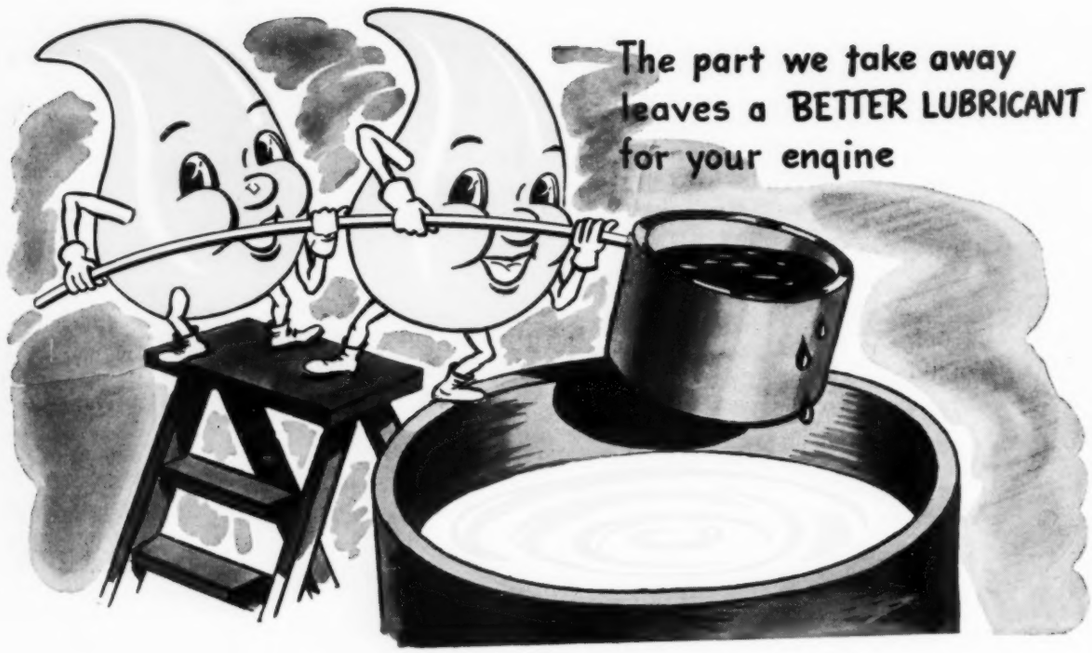
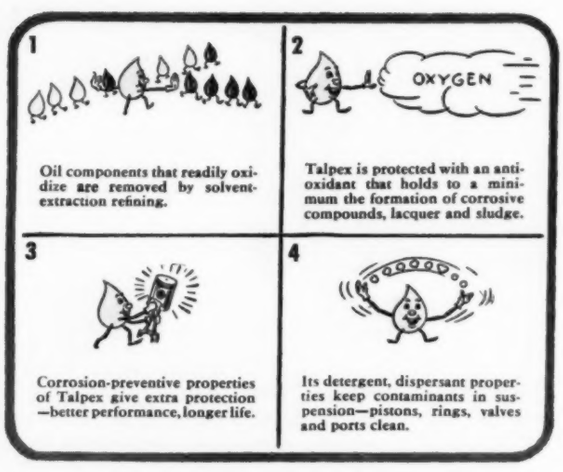


THESE FOUR *TALPEX* PERFORMANCE FACTORS SAFEGUARD HIGH-SPEED DIESELS


1
Oil components that readily oxidize are removed by solvent-extraction refining.
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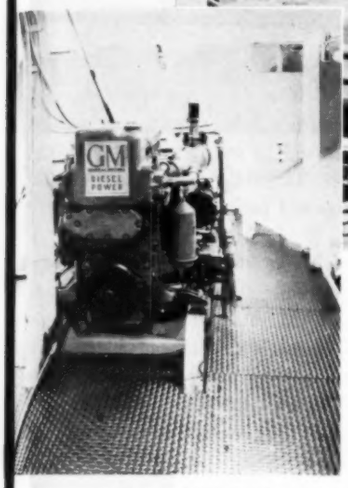
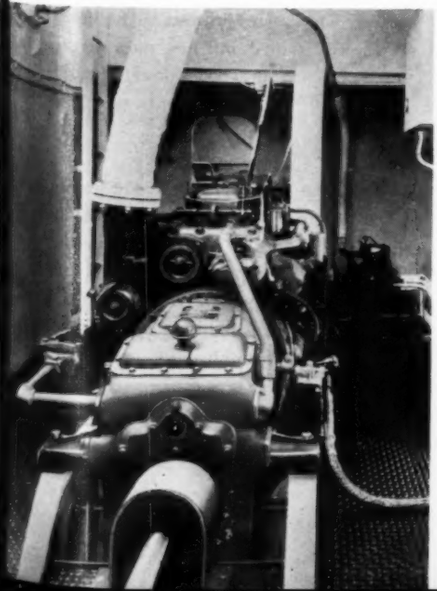
SHELL DIESEL LUBRICANTS



"Floyd Hamilton's" engine room forward, showing Diesel propulsion unit.

SMALL DIESEL TUG

"Floyd Hamilton's" engine room from forward, showing Diesel propulsion unit.



THE Equitable Equipment Company, Inc., which celebrated its 25th year of business on March 12, 1946, has an enviable record as the successful biulders of steel pontoons, coastwise and harbor tugs, barges, houseboats, etc., including the wartime manufacture for the Army Quartermaster Corps of a series of 82 ft. and 102 ft. steel tugs. It was no trick at all for them to turn out the 45 ft. all-steel tug *Floyd Hamilton*, which has gone into service in the Lake Charles ship channel near Cameron, Louisiana.

The *Floyd Hamilton*, overall length 45 ft.; beam 12 ft. 5 in.; moulded depth 6 ft. 10 in. and draft 4 ft. 6 in., was designed by Equitable Naval Architects. The hull was plated throughout with 5/16 in. thick plating to withstand the hard service to which it would be subjected.

She is built with three transverse watertight bulkheads with a watertight door between the forward engine room bulkhead and crew bunk room forward. Forward of the engine room there are two bunks for the crew, which with a full length cushioned seat in the pilot house, make the boat capable of sleeping three men. A steel, fiber-glass insulated, raised pilot house with windows in forward, port and starboard sides and after-end affords clear vision in all directions. Doors to the pilot house are on both starboard and port sides.

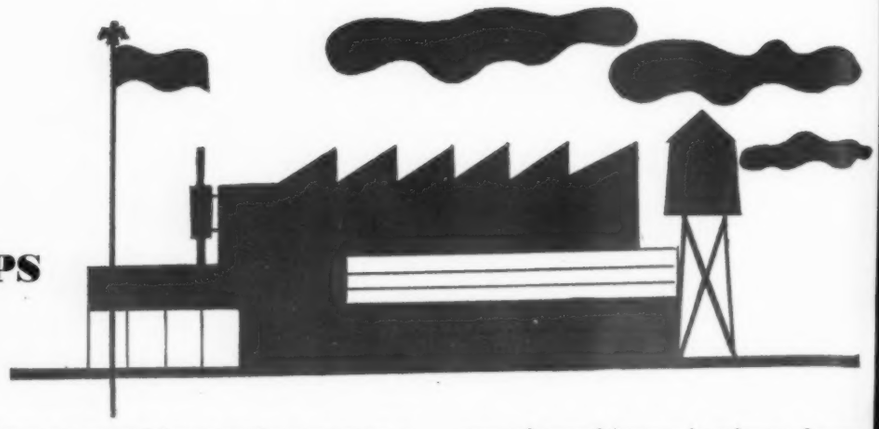
The General Motors Diesel marine engine, 4-cylinder, 2-cycle, 4¼ in. bore x 5 in. stroke, develops 110 hp. at 1850 rpm., and is equipped with a 3:1 reduction gear, reverse gear and heavy-duty clutch. With the engine throttled to 1500 rpm. for normal cruising and towing conditions, the engine delivers 90 shp. at 500 shaft rpm. and gives fine towing performance turning a heavy-duty 3-bladed Columbian bronze propeller of 36 in. diameter by 28 in. pitch. The cruising speed running free (1500 rpm.) is nine statute miles per hour.

Another feature of this small compact tug is a 1200 watt gasoline, air-cooled engine-driven auxiliary generator which is equipped for electric starting from the 32-volt main engine starting batteries. These heavy-duty Exide batteries furnish current for the lighting circuits when necessary. When under way, a 900-watt, 32-volt generator, gear driven from the main engine, furnishes current for the running lights, towing lights, searchlights and recharges the starting battery. All electric wiring and fixtures are of approved marine type, wiring is leaded and armored basket weave and fixtures of heavy brass. A running light switch panel is mounted in the pilot house, while the main switchboard is located in the engine room.

The one-man operated full pilot house controls for the tug and main engines are all banked together on one common steel vertical stand, housing clutch lever, throttle, fuel oil cut-off, ammeter, lube oil thermometer, cooling water thermometer, oil pressure gauge, mechanical tachometer and horn button which also controls amber blinker signal light.

There is a raised steel engine trunk with hinged bronze ports over the engine room with a removable bolted and gasketed dummy stack section. The stack houses the exhaust silencers. This section can be removed and the propelling engine lifted out intact. A hatch is provided on the after port side with ladder for access to the engine room.

DIESELS LIFT TOWN OUT OF ECONOMIC DUMPS



By T. J. MALONE

MELROSE, Minnesota – a "ghost town" only ten years ago, with industry flat and everybody down in the mouth—today is a thriving community, with good payrolls and everybody smiling. Then hundreds of men were jobless, many families on relief and homes going for taxes; now there is work for everybody and not a dwelling for rent in the place. Almost everybody in Melrose, estimated population 2,700, seems to have money ahead.

Installation and performance of a municipal Diesel electric plant equipment supplied by Fairbanks, Morse & Co., largely accounted for this economic rebound. The plant began operation July 1, 1937, and the town has been on the upgrade ever since. Favorable power rates to industries along with dependable service explain it all.

A series of major setbacks, beginning soon after World War I, led to the city's decline. A large granite works moved to a site nearer the source of material. Railroad division shops and offices were transferred, taking scores of employees with them. Two banks failed, cutting into the savings of the people.

Citizens of vision and leadership tackled the problem of what to do. The country around was one of the richest farming areas in the state. Shipping facilities were ample. It seemed plain that industries of the growing and staying kind would be such as dealt with the products of the land. To attract such industries, the answer lay in favorable electric power rates.

Since 1905, a municipal steam power plant had provided the community's electric service. Its rates were too high to appeal to industries. In the effort to lift itself by its bootstraps, the city, in the midst of depression, replaced the steam plant with Diesels.

That was the point of upturn. Today Melrose's industries include a large plant turning out such products as cheese, powdered milk and plastic cream; a plant processing poultry and eggs; two memorial stone works; a creamery; a sash and door factory.

As the start in the campaign for survival, the three-member municipal light, water, power and building commission—official title of the power board—replaced the steam plant with two, four-cylinder, 300 horsepower Diesel engines with auxiliary equipment. The pickup was so marked that in little more than two years (November, 1939) a six-cylinder, 690 hp. Diesel was added.

In 1944, energy demand was crowding plant capacity so hard that peak loads were being met only by cushioning the service to the REA "coop." The coop operates a power station of its own in another part of the area and it and the Melrose plant tried to accommodate each other's peaks in true cooperative spirit. In that year, with its three units running almost to capacity, day and night, the Melrose plant averaged 13 kilowatt hours to a gallon of fuel oil.

Bursting at the seams, the plant, after enlarging its building, installed a fourth Diesel last July, a seven-cylinder, 1,400 hp., with auxiliaries. All four engines are of Fairbanks-Morse make. The four units have a combined 2,690 horsepower. Their rated capacity is 1,853 kilowatts; by units, 200—200—473—980. The average load in 1945 was 1,150 to 1,200 kilowatts, the peak, 1,450.

Total investment in the Diesel plant was $297,850 as of December 31, 1945, without depreciation. This included a paidup investment of $65,100 comprising the distribution system of the former steam plant. Plant earnings had retired a total of $133,350 in revenue certificates by the end of 1945. It is expected that the $99,400 debt will be retired in three years or less.

The total revenue for 1945 was $74,248.55 and the operating expenses $48,318.32; earnings of $25,930.23 were 34.9 per cent of revenue. Because of assured increase in volumes of energy generated and sold, yearly earnings in the next few years should be considerably in excess of that in 1945. In 1944, revenue was $55,722.29 and earnings 30.4 per cent of revenue.

How does service to the REA cooperative tie in with the operating program? The cooperative has about 2,300 subscribers, including eight creameries, a cheese factory and a flour mill. The Melrose municipal plant, serving more than half of the co-op's consumption, supplied 1,768,600 kwh. to it in 1945 at an average rate of 1.19 cents per kwh.

When the Diesel plant took over, it continued for a short time the current rates of the steam plant. These, flat rates for all services, were: first 30 kilowatt hours, 12½ cents a kwh.; next 20 kwh., 10 cents; excess, 8 cents. Beginning October 1, 1937, new rates were put into effect, for different service schedules.

The residential schedule was: first 30 kwh., 8 cents; next 10, 7 cents; next 60, 3 cents; excess, 2 cents. That schedule has never been changed, is in effect today. There were 454 residential meters in 1945. There were 103 stoves and 43 electric hot water heaters.

Commercial power rates, to begin with, were as follows: first 100 kwh., 6 cents; next 100, 5 cents; next 300, 4 cents; excess, 3 cents. These rates continued until July, 1943, when the commission was satisfied that lower rates for large consumptions were justified. The first three rates were retained, but new rates were set for consumptions above 500 kilowatt hours: next 500, 3 cents; next 2,000, 2 cents; next 2,000 1½ cents; excess, 1 cent.

Another side of the picture is the free services given by the municipal plant. These include all water pumping for the community and lighting of streets, public schools and city hall. Actual cost of these services averages about $2,750 a year. In addition, special Christmas street lighting is supplied without charge, as is

Melrose, Minnesota, municipal light and power plant which supplies town of 2,700.

View of 3 of the 4 Fairbanks-Morse Diesel generators. 6 cylinder, 690 hp. engine is in left foreground. Two 4 cylinder Diesels in background.

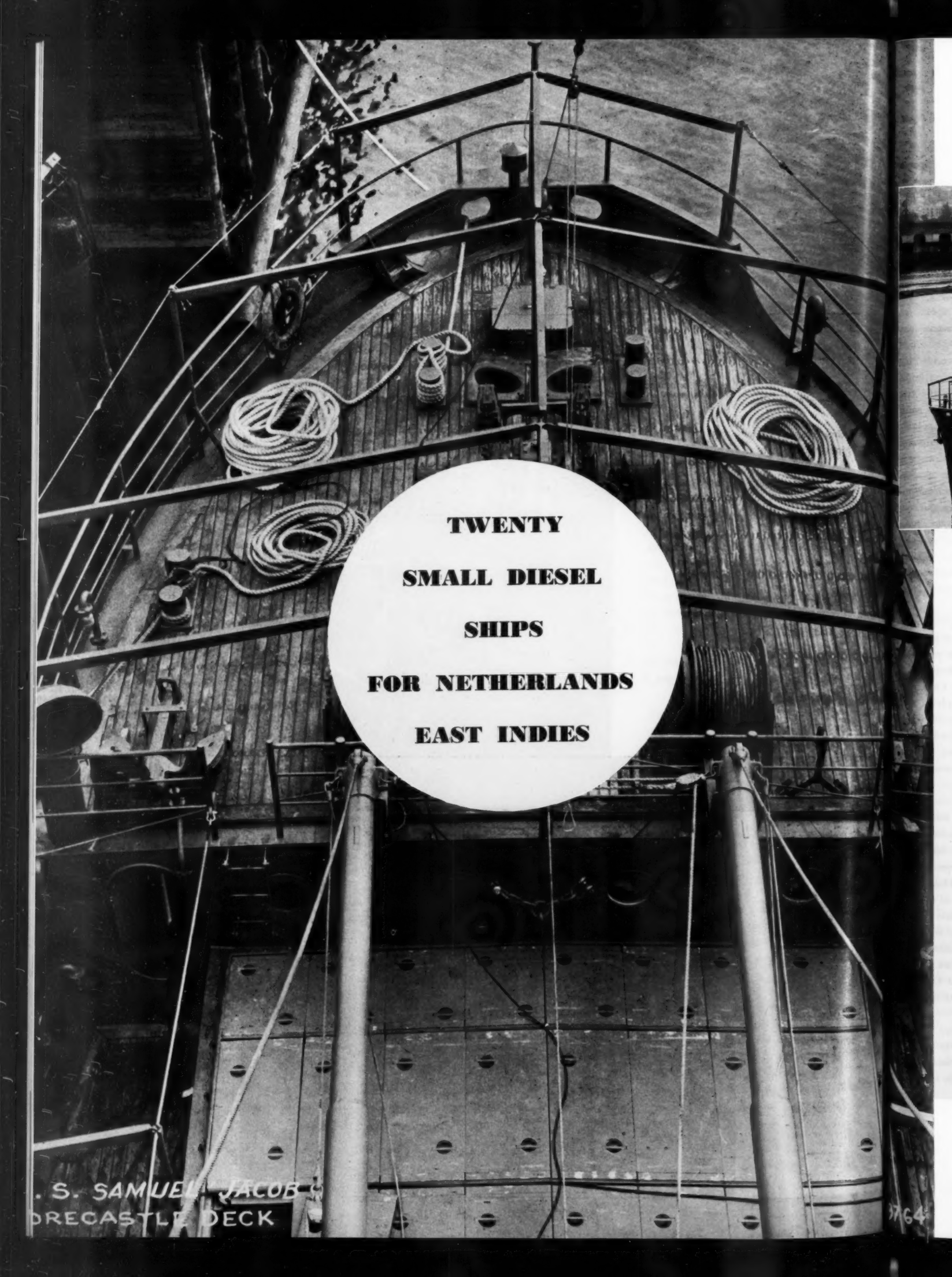
lighting for two public ice rinks, power for the town fire siren, and so on.

Exhaust heat from hot water circulating through the engines is used to heat the plant building.

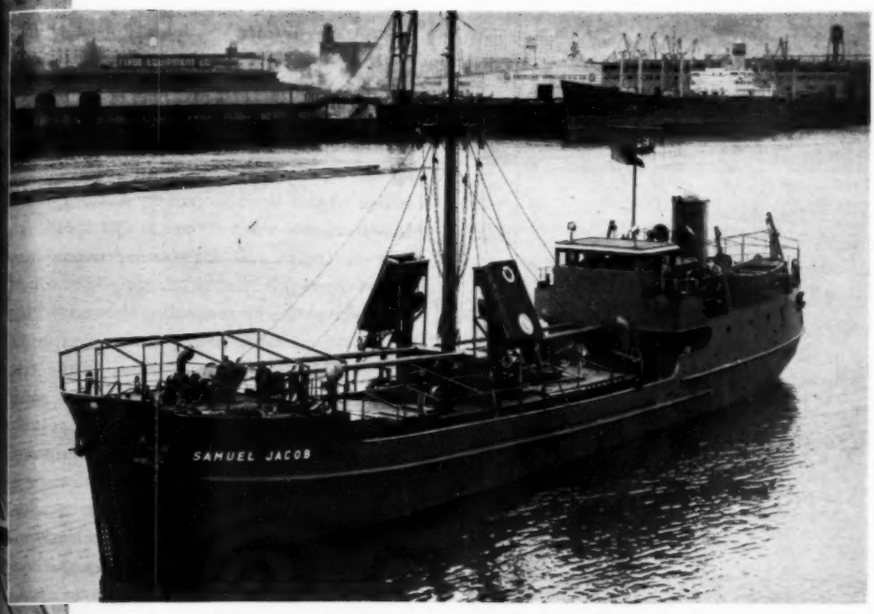
Of the plant's governing commission, U. C. Schlicht and Charles Hofman have served through the Diesel period and had been on the steam-plant board as well. C. W. Carlson, the third member, is chairman. Ignatius Lemm, secretary, had served the old board in that capacity. He is also city clerk. Joseph Fern, plant superintendent, served through the entire steam-plant era and has kept right on with the Diesels.

Truly this Diesel powered municipal plant has lifted the enterprising town of Melrose out of the economic dumps.

7 cylinder, 1400 hp. Fairbanks-Morse Diesel generator at Melrose plant.

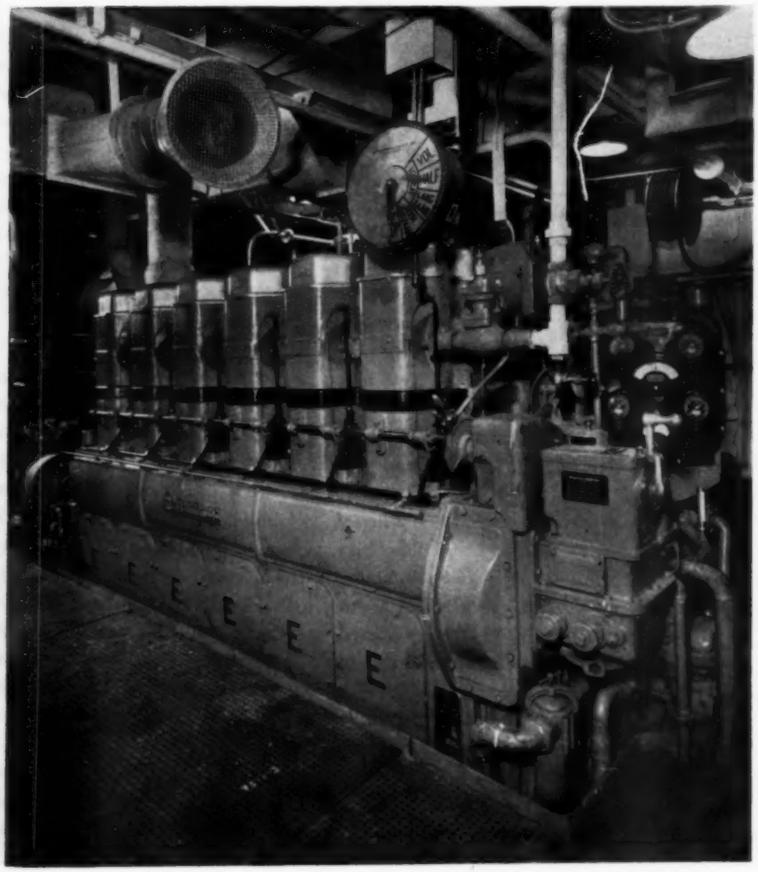

TWENTY
SMALL DIESEL
SHIPS
FOR NETHERLANDS
EAST INDIES

By CHARLES F. A. MANN



The Diesel ship "Samuel Jacob" lying off Portland docks. She was designed for the East Indies Trade.

Control side of Enterprise 6 cylinder 275 hp. Diesel which supplies propulsion power for ship.



LOOKING somewhat like a small, shallow draft design of a "handy" type U. S. Army freighter developed at the outset of the war, a fleet of 20 shallow-craft Diesel freight vessels is rapidly nearing completion at the busy yard of Albina Engine & Machine Works, Portland, Oregon, on the Willamette River.

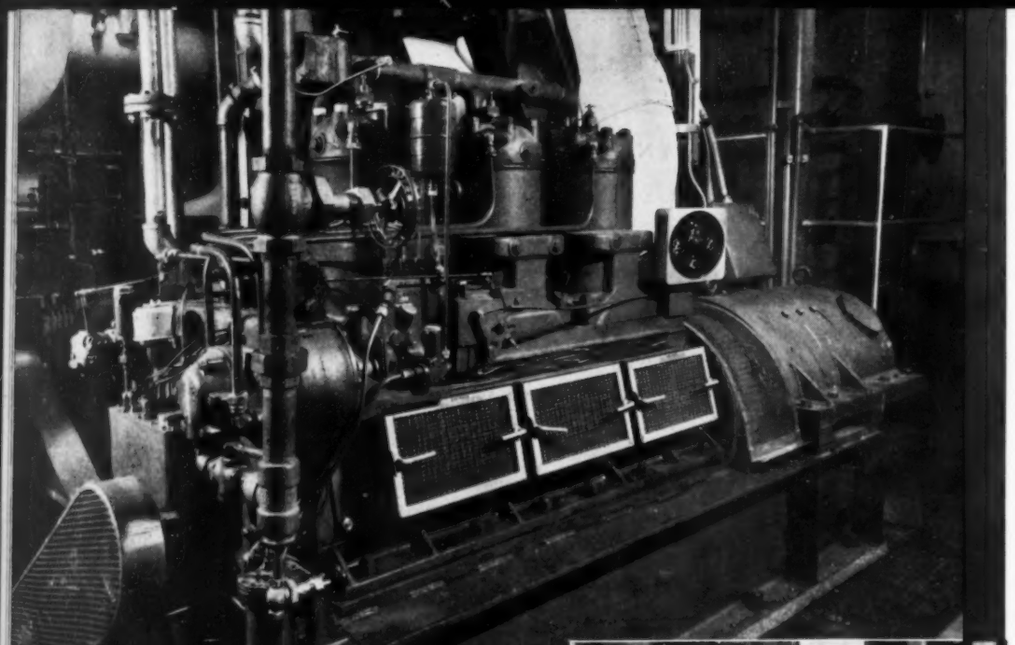
These small freighters, with only 8 ft. draft loaded, are almost the right size for wholesale application along U. S. Rivers and Atlantic Coastal waterways, and they embody every practical and thrifty innovation the Netherlands East Indies Government will require in operating them over the vast, 1,500 mile string of tropical islands that comprise the Dutch empire in the Southwest Pacific.

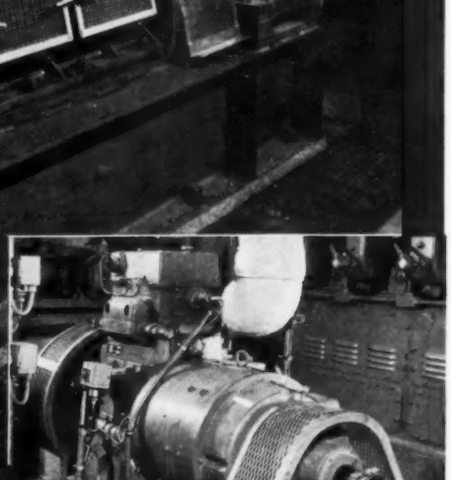
The contract for construction of this Coastal fleet was let early in 1945, for a price reported at about $375,000 each, let on open bid between the Board of Netherlands Indies and the Netherlands Purchasing Commission. Plans followed a modification of a ship type widely used in Holland and European North Atlantic waters, and were designed to provide a handy, flexible and very economical type of Coastal ship that would supplement service provided by Big Four Dutch ocean steamship companies, to hundreds of small ports, most of them without even docking facilities, and many that require transfer of freight to small, flat bottomed 28 foot boats carried on the upper deck of each ship.

Principal dimensions are as follows:

Length overall	180 ft. 7 inches
Length B.P.	170 ft.
Beam, molded	29 ft.
Depth, molded	10 ft. 6 inches
Draft, loaded	8 ft.
Displacement, loaded	850 tons
Deadweight	460 tons
Shaft horsepower	250
Speed, service	8½ knots

With postwar traffic made heavier by the need of rebuilding the war-ravaged parts of the East Indies, the Dutch Government turned to U. S. West Coast builders to speed the building of a fleet of small ships to supply more than 2,000 islands in the East Indian archipelago, and deliver them in the shortest possible time. Albina Engine & Machine Works has successfully completed over 160 smaller special types of ships for the U. S. Government, and was able to undertake the Dutch contract without any delays for change in facilities or training of manpower. The little vessels will serve to distribute food, clothing and relief supplies and





One of two auxiliary Diesel generating sets, consisting of a 2 cycle, 3 cylinder Venn-Severin Diesel driving a 40 kw. Burke generator.

A Lister-Blackstone Diesel developing 16 hp. supplies emergency power and also drives a 2 cylinder Quincy compressor.

return to the principal ports of Soerabaya, Samarang and Batavia with sorely needed copra, rubber, hemp, jute, tin, spices and sugar for immediate shipment to major countries.

Cox & Stevens, Inc. of New York prepared the plans and specifications in cooperation with J. W. R. Thomson of Soerabaya; P. A. van Hecking Colenbrander, Naval Architect of the Netherlands Navy Department and T. Veerman, Inspector of Shipping of the Netherlands East Indies government. Claude Butler of the Albina yard is in charge of detail plans. Dutch Government representatives at Albina include G. H. van der Stoop and Capt. J. Nunnik.

The ships are of all welded steel construction, built under special survey of the American Bureau, Class A1, Coastwise, E. They are of the raised quarterdeck type, with crew's quarters in the forecastle. Pilot house, crew's quarters for gallery officer, steward and cook and two passengers are located over the machinery space, far aft. Gun mounts were originally fitted forward and aft. Two cargo hatches give access to the entire central portion of the vessels, and the holds are served by a single mast with four 5-ton booms. To protect native crews who walk in their bare feet, decks are planked. All lumber used on the ship is wolmanized to protect against humidity, termites and ants and all controls on the ship are for "standup" operation, as East Indian natives prefer to do everything except sleeping, standing up.

The hull design permits operation in heavy weather, offshore, as well as up shallow bays and up river channels, and special reinforcing for protection against striking rocky ledges and bars. Two heavy 28 ft. lifeboats are mounted aft of the wide pilot house. These are used as lighters as well as lifeboats. Native deck passengers are carried on the cargo deck, under canvas shelter. They eat and sleep right on deck while making interport hops.

The vessels are each powered with a heavy duty Enterprise Diesel, rated at 275 hp. at 275 rpm.—small compared with the huge power plants placed in boats half this size in the Pacific Coast fishing fleet. The Enterprise main Diesel is of four cycle design, with 12 inch bore and 15 inch stroke and is direct reversing. Starting air is supplied by a 2-stage Quincy compressor. The propeller is a 4 ft. 3 in. pitch bronze wheel, 5 ft. 7 in. diameter.

Twin auxiliary generating sets are provided, for use when working cargo winches, etc. These consist of two Venn-Severin 2 cycle, 3 cylinder Diesel engines, rated 60 hp. at 720 rpm., with base scavenging and Air-Maze air inlet filters. These engines drive a 40 kw. compound wound Marine type Burke generators, delivering power at 115 volts. A simple 2-wire electric distribution is used, to conform with the type generally used by the Netherlands Indies native crews and engineers. These units are air-started. Insulation on all electrical equipment, including motors and generators is of a special type to withstand tropical climate. A third generating plant is supplied in the form of a Lister-Blackstone emergency standby unit, consisting of a 16 hp. Lister-Blackstone 2 cylinder, 4 cycle, 1200 rpm. Diesel, driving a Kurz & Root 10 kw. generator; a 30 gpm. auxiliary bilge pump; a 2 cylinder Quincy air compressor, rated 11 cfm at 280 psi., at 600 rpm., driven by a V-belt drive.

A 200 gpm. fire and general service pump; 40 gpm. sanitary pump; 50 gpm. bilge pump and 20 gpm. fresh water pump—all made by Buffalo Pump Co., are fitted, as well as a Carrier 2½ ton Freon refrigeration pump, supplying a 125 ft. vegetable compartment, held at 40 deg. F., even in hottest tropic weather, and a 125 cu. ft. meat compartment held at 15 deg. F., with refrigerant cooling arranged to handle warm sea water.

Elaborate radio and deck lighting facilities are fitted, including a medium-frequency Radio Marine 50 watt set with radius of from 300 to 1,000 miles and a 50 watt high frequency transmitter with ocean wide range. A Hughes Echo Sounding set is provided, capable of operating up to 130 fathoms. A Kelvin-White Compass and sounding machine and Trade Wind porthole electric fans made by the Allen Bradley Co. and Markey Deck Machinery are fitted, all electrically operated. A CO-TWO fire protection system is fitted in the engine room.

As of May 1, ten of these ships had made the trip from the Columbia River to the East Indies, weathering severe storms without incident, and first reports indicate they have functioned well in service.

COOPER-BESSEMER ANNOUNCES NEW V-TYPE DIESEL

A V-TYPE Diesel is being built by The Cooper-Bessemer Corporation. The new engine –the "FV"—is built to furnish power for locomotives, shallow-draft river boats, draglines, dredges, excavators and various other stationary and industrial applications. It is a four-cycle engine with a 9-inch bore and a 10½-inch stroke and is being built in 12 and 16-cylinder models.

Among the details of design are a four-valve head, a one-piece cylinder and head assembly, and a geared accessory drive which is enclosed in the main frame. These new Cooper-Bessemer engine features make the "FV" particularly suitable for numerous stationary and industrial power serivce as well as for direct-reversing marine use.

The Meehanite main frame, which carries an underhung crankshaft, has bearings located in the cross-ribs. These are the precision-ground, interchangeable type.

There are two banks of cylinder bolted to the top of the frame forming a "V" with an included angle of 45 degrees, or 22½ degrees from the vertical center line on each side. Each cross-rib is bored in two places to hold bearings for the two camshafts. The top of the frame is drilled over each cam to take the push rod guides and assembly. Removable inspection covers on each side of the frame provides ready access to the crankshaft and camshaft. A crankcase oil pan is bolted to the under side of the main frame.

The "FV" crankshaft, machined to close dimensions and highly polished at the bearing areas will be of forged steel or cast Meehanite, depending upon the application for which it is built. The connecting rods are of articulated design with one rod serving as the master. Piston and connecting rod pins are of the Cooper-Bessemer patented saddle-end design which offer a maximum bearing surface. The pistons are oil-cooled, affording even distribution of heat and improved operating characteristics.

The entire cylinder and head assembly is cast in one piece, a striking departure from the usual design and it includes a jacketed cylinder, a cylinder head containing main valves, air-starting valves, a fuel-injection nozzle and a support which carries rocker arm parts and fuel pump.

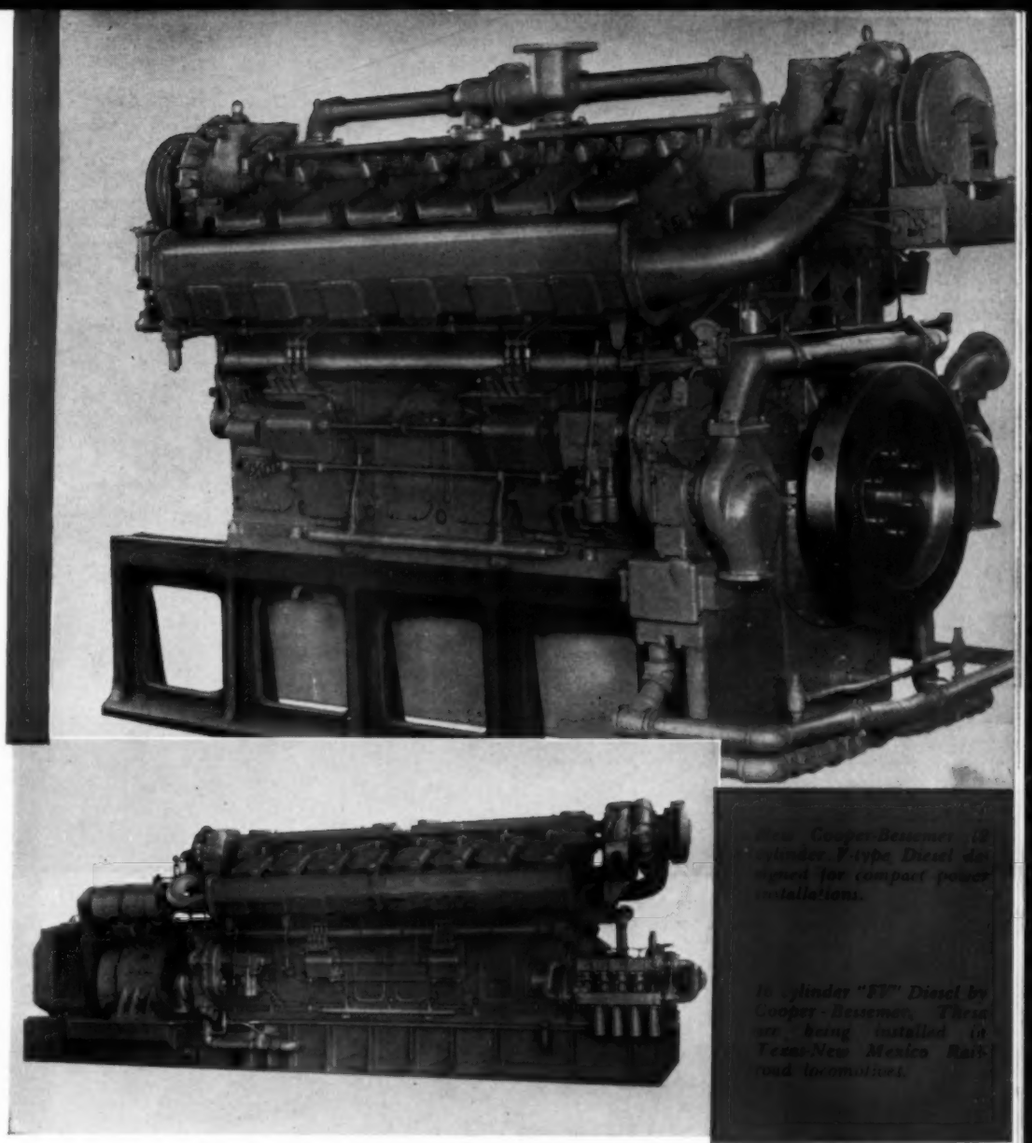
Two exhaust valves and two intake valves are contained in each cylinder's four-valve head. The valves are actuated by a push rod from the camshaft and a cross push rod. The engine camshaft, lubricating oil pump, water pump and other accessories are driven from the camshaft by a series of gears and the accessory drive assembly is enclosed in the main frame of the engine at the flywheel end.

Fuel injection on the Type "FV" is by means of a jerk pump system in which each cylinder has its own measuring and injector pump, mounted close to the spray valve located in the center of the cylinder head.

The engine is entirely pressure-lubricated, and may be furnished with either wet or dry sump to suit the application. The oil pump, which is located on the knee of the engine, picks up the lubricating oil and discharges it through an oil cooler and a strainer to the lube oil header near the top of the frame. From the header, oil is conducted throughout the engine for lubricating moving parts and for cooling the pistons.

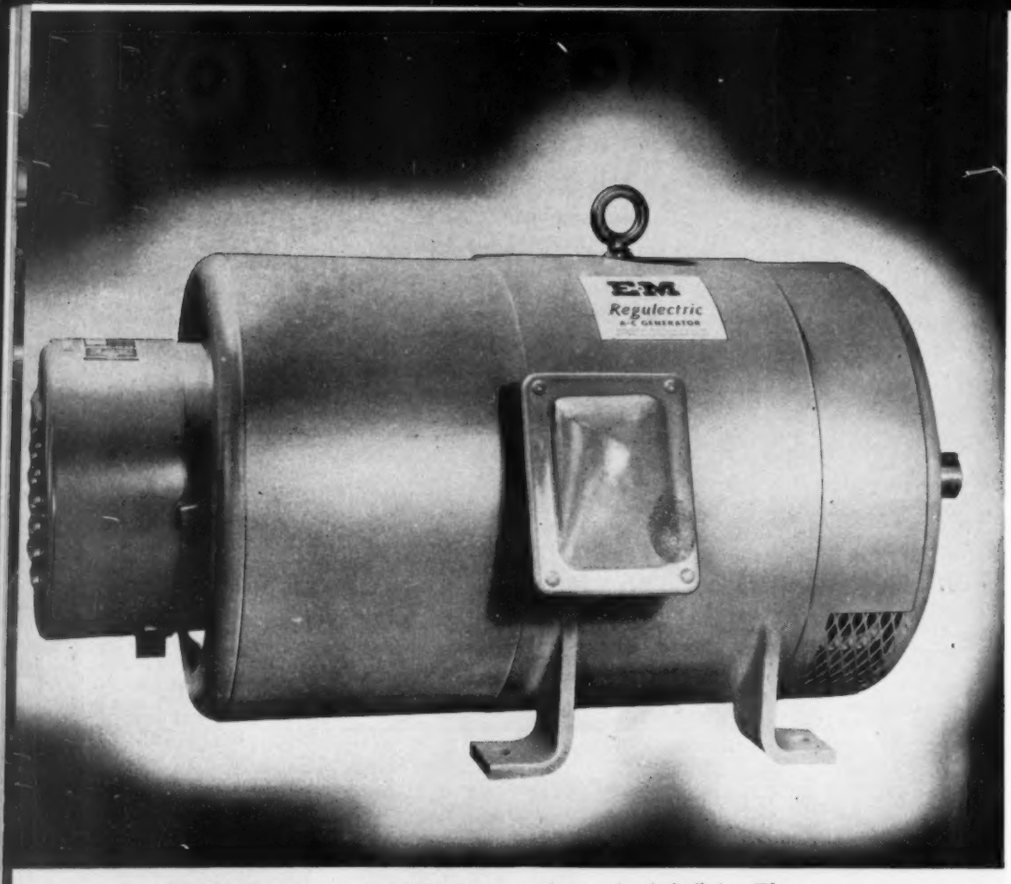
The cooling system includes two double centrifugal pumps, with one impeller of each pump handling jacket water and one handling raw water. These pumps are identical and are driven from the crankshaft through the accessory gear drive.

The intake manifolds are welded steel units which bolt to the cylinder assemblies on the outside of the banks of cylinders. The exhaust manifold is of welded steel construction. For the atmospheric engine it is water-jacketed and for the supercharged engine it is water-blanketed to reduce radiation. It is supported on the main frame in the "V" of the engine by means of brackets. These manifolds have separate gas inlet connections from each cylinder and a single flanged outlet.

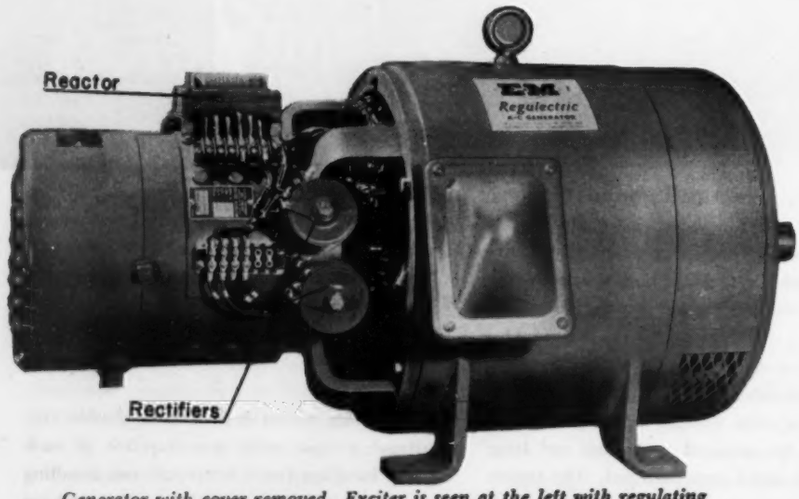


Cooper-Bessemer 16-cylinder V-type Diesel designed for compact power installations.

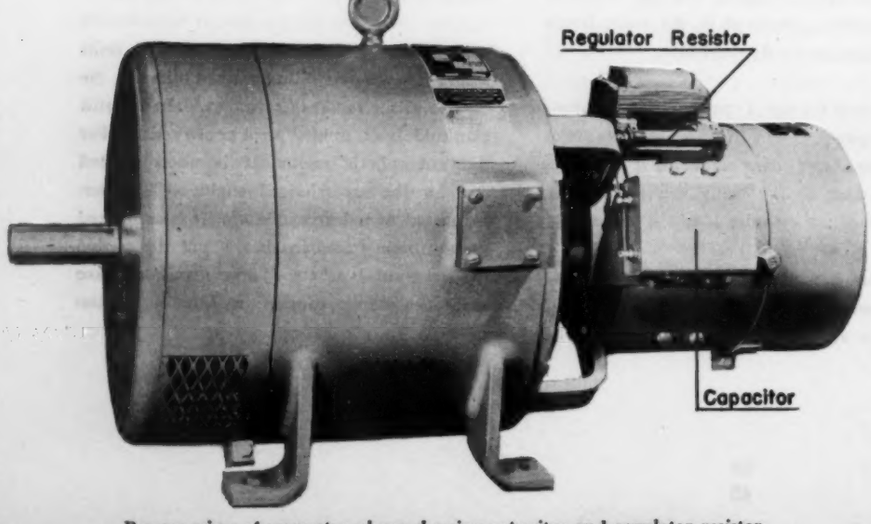
16-cylinder "FV" Diesel by Cooper-Bessemer. These are being installed in Texas-New Mexico Railroad locomotives.



Regulectric A-C generator which has a regulating circuit built-in. There is no need for separate accessory voltage regulating devices.



Generator with cover removed. Exciter is seen at the left with regulating circuit components mounted on a replaceable saddle.



Reverse view of generator above showing capacitor and regulator resistor.

HOW THE REGULECTRIC GENERATOR WORKS

THE basic operating elements of the "Regulectric" circuit as shown in Fig. 1, consist of the following:

1. Reactor
2. Capacitor
3. Full-Wave Dry-Disc Type Rectifier
4. Blocking Rectifier (Dry-Disc Type)
5. Regulator Resistor

The operating principle of the "Regulectric" is the amplification obtained when a-c voltage from the generator is supplied to a near-resonant circuit consisting of the reactor and capacitor in series, as shown in Fig. 1. It is a well-known phenomenon that when a-c voltage is put across a reactor and capacitor in series, and the reactances of the capacitor and reactor are proper, a resonant condition can be achieved, in which case the voltage across the reactor or capacitor can be much higher than the a-c voltage applied to the series circuit. The "Regulectric" employs a brand-new use of this century-old series-resonance phenomenon.

Fig. 2 shows diagrammatically how a change in generator voltage produces, at the near-resonant condition used in the Regulectric circuit, a steep change in voltage Ec, across the capacitor. That is, a small change in generator voltage is amplified across the capacitor. This amplified capacitor voltage is used to control the voltage of the exciter, and hence to regulate the A-C generator as explained below.

As seen in Fig. 1, the voltage across the capacitor is fed to a full-wave rectifier. The direct current output of the rectifier is connected across the regulator resistor, and through a blocking rectifier to the exciter field. Note

that the polarity of the full-wave rectifier is such as to *oppose* the polarity of the exciter.

That is, the rectified voltage from the capacitor acts in opposition to the voltage generated by the exciter. Thus the net voltage operating on the exciter field is the difference between the opposing rectifier and exciter voltages.

Now assume an increase or decrease in the A-C generator voltage above or below normal due to change in load on the generator. This increase or decrease produces a corresponding amplified increase or decrease of voltage across the capacitor, due to the near-resonant relations between the reactor and capacitor explained previously. This amplified voltage is impressed upon the rectifier which, in turn, is used to regulate the exciter as follows:

When the voltage of the A-C generator increases, the voltage across the capacitor increases in much greater proportion, and likewise the direct current produced by the full-wave rectifier. This rectified voltage opposes the voltage applied to the exciter field winding by the exciter, thus reducing the magnetic field flux of the exciter and the exciter voltage and, in turn, reducing the voltage across the field winding of the A-C generator and hence the voltage of the generator. Conversely, when the voltage of the A-C generator decreases, the voltage produced by the capacitor through the rectifier decreases at a much greater rate thus decreasing the opposition to the exciter voltage, allowing the exciter voltage to increase and thus to increase the voltage of the A-C generator. The action of the Regulectric circuit thus operates to control the A-C generator voltage and hold it constant despite changes in load on the generator.

The blocking rectifier acts as a valve to permit flow of the d-c current in the proper direction only. Its purpose is to prevent injury to the full-wave rectifier if, for any reason, the exciter polarity should momentarily become reversed.

A potentail transformer (not shown in Fig. 1) is necessary when the A-C generator voltage is greater than 120 volts. An "Impedance Matching Transformer" (not shown in Fig. 1) may or may not be used in addition to the reactor depending upon the requirements of the particular exciter used. The potential transformer and impedance matching transformer, when used, are included in the parts mounted on the Regulectric "saddle" illustrated in Fig. 3, which is bolted to the exciter frame and is easily removable.

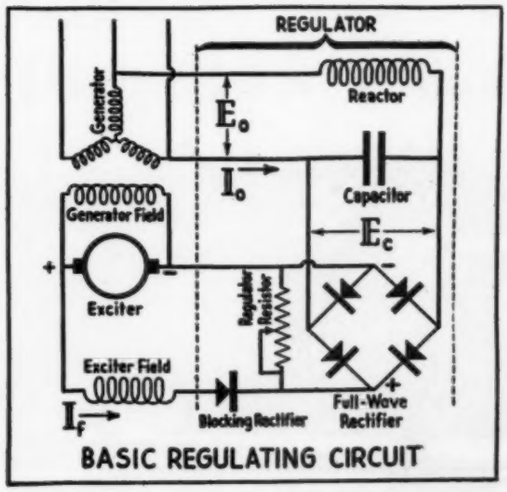


Figure 1. Drawing of basic regulating circuit of the generator showing the series relationship of capacitor and reactor circuits.

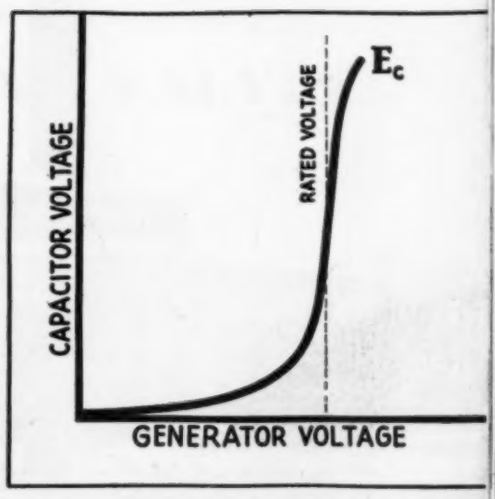
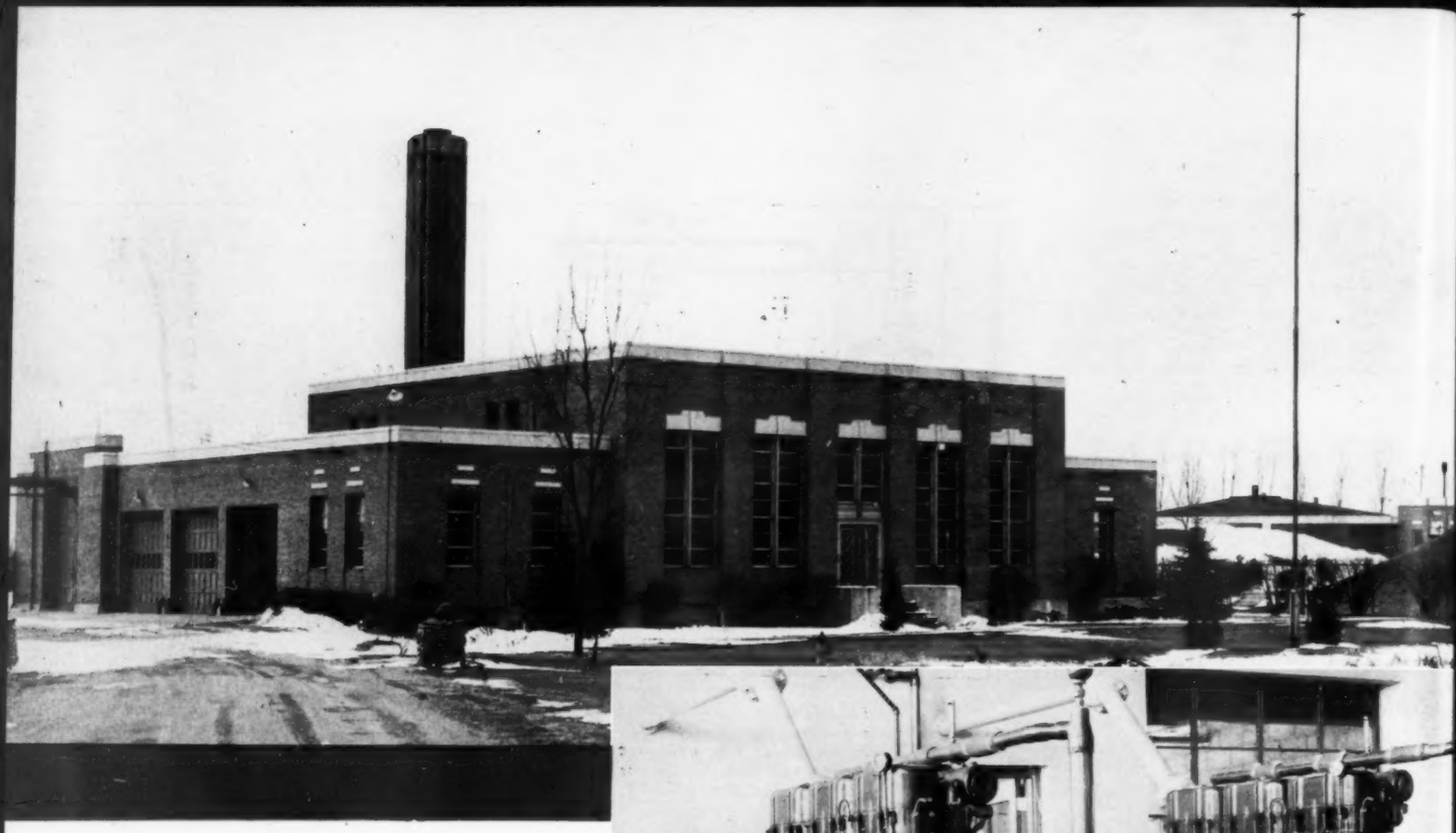
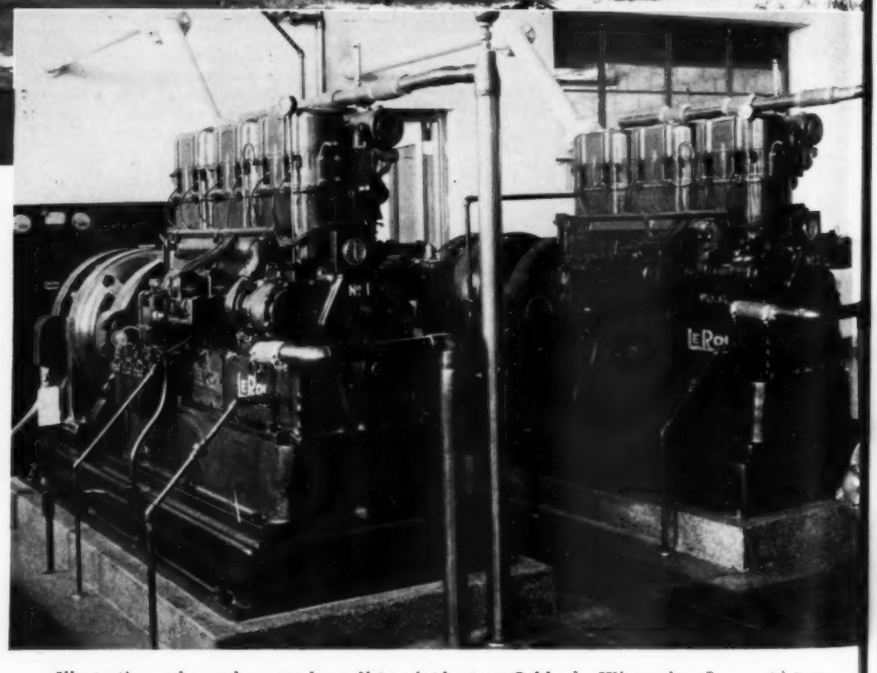


Figure 2. Diagrammatic relationship of capacitor and generator voltage, showing how a small change in generator voltage is greatly amplified across the capacitor, which voltage is in turn used to control A-C generator.

Figure 3. Regulating parts of generator are mounted on saddle which is bolted to the exciter frame.





DISPOSAL PLANT USES GAS ENGINES

By F. W. CROSS*

Illustrations above show modern disposal plant at Oshkosh, Wisconsin. Lower picture shows 2 Le Roi 6 cylinder engine generators which operate economically on sewage gas.

MODERN sewage disposal plant engineers have learned that the sewage gas present in all plants may be utilized to advantage. This sewage or sludge gas varies in BTU content in different plants. However, where sufficient quantity is available it can be used to operate gas engines to drive generators, pumps, or blowers. A particularly successful installation of such equipment is at Oshkosh, Wisconsin, where two Le Roi engine-generator sets have been operating since October 1937. These 2 Le Roi 6 cylinder engines, direct connected to 50 kw., three phase, 60 cycle, 440 volt, induction generators are the source of electrical power to operate a large percentage of the plant's machinery. Records of all operating expenditures have been maintained meticulously and show an actual savings in power cost of $27,720.77 in the first seven years of operation. During this period these two generator sets produced a total of 1,886,350 kw. hours which at prevailing public utility rate would have cost $37,-205.03. The actual cost was $9,484.26 which represents a saving of $27,720.77 to the city of Oshkosh and figures out to be electric power at ½ cent per kw. hour. In addition to providing this reliable power at the record low rate further savings in fuel oil were effected by circulating hot water from the engine jackets through the building heaters and digesters. These generator sets have been maintained in the finest condition at all times, which has undoubtedly contributed to the overall savings. All maintenance details have been checked implicitly, and this installation is in new condition today.

The history and records of the Oshkosh plant are typical of many Le Roi installations in daily use in modern disposal plants all over the world, all of which are showing remarkable savings over previous methods, even to the extent of paying off the cost of the entire installation in a matter of months.

* *Sales Engineer, Le Roi Company*

INSTALLATION AND MAINTENANCE

INTERNAL COMBUSTION ENGINE VALVES, SEATS AND GUIDES

By J. D. CREEK

This article is a condensed version of a paper written by J. D. Creek, Mid-Continent division manager of Thompson Products, Inc. Mr. Creek's twenty-three years of experience with one of the largest engine valve manufacturers qualifies him to write on the subject he has chosen.

THE valve mechanism of a four cycle internal combustion engine has often been referred to as the heart of the engine. Of the greatest importance, then, is the necessity of obtaining as nearly as possible perfect alignment between the valve, seat and guide, so the valve and seat may perform their function of sealing without undue interference.

Assuming that a new valve as it comes from the manufacturer is straight and the face is concentric with the stem to within the required limits, little preparation is needed for its installation. The valve stem and the inside bore of the guide should be measured to determine if proper allowance has been made for running clearance.

A safe rule to follow on exhaust valves with alloy steel stems is to allow one-thousandth of an inch for every eighth inch of stem diameter. Valves with stems larger than 1½ in. in diameter will generally operate with less clearance than provided by the above rule. Inlet valves should operate with clearances of approximately one thousandth of an inch for each three-sixteenths inch of stem diameter. Table No. 1 gives recommended clearances for valves of various stem diameters.

Valves which have been in operation for some time and are removed from the engine for servicing should be checked for wear on the stem, straightness of the stem, and if necessary, should be refaced. Concentricity of the valve face to the stem should be held within limits of a maximum of three-thousandths total run-out. The valve face angle should be reground to exactly match the seat face angle, unless guttering has occurred during the valve's operation in the engine. Where this condition occurs, it is advisable to face the valve at an angle ½° flatter than the seat face angle. This exerts greater pressure on the upper edge of the valve face and assures more certain sealing of the valve on the seat as shown in figure 2.

The accepted engineering practice is to have the valve face overlap the seat face on both the upper and lower edges. This method provides a more positive sealing arrangement and precludes the possibility of undue seat and guide wear when misalignment occurs between these parts. Inasmuch as about 90% of the heat absorbed by the head of an exhaust valve must be transferred through the face during the short interval it rests on the seat, it is essential that the contact area be sufficient to properly effect this transfer. On the other hand, too great a contact area produces low unit pressure against the seat and may result in valve flutter.

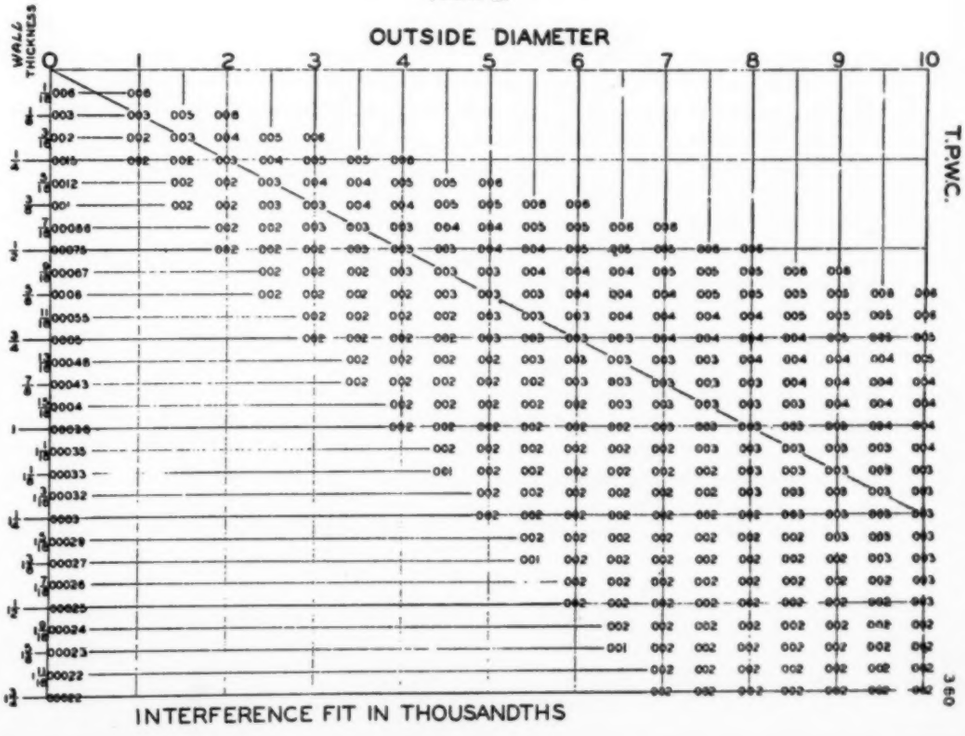
VALVE SEATS

It has become general practice in the past few years for engine manufacturers to equip their engines with removable exhaust valve seats. This has been accomplished by means of a ring insert, usually held in place by installing it with an interference fit between the insert and the counterbore. In some instances, threaded seats have been used, but in most cases without great success. This is due to the fact that, unless the threads are ground to a perfect mating fit on both the seat and in the counterbore, great loss of heat transfer occurs.

First, let us outline our recommended method of installing seat inserts which are held in place by interference fit. The fit is determined by the outside diameter and the radial (wall) thickness of the insert. Table number II shows recommended allowances for alloy steel inserts. Due to the fact that most alloy steel seats have a slightly higher co-efficient of expansion and greater elasticity than cast iron, it is not desirable to force them into the counterbores with a large interference fit. It is recommended that the inserts be shrunk before their installation in the counterbore. Dry ice is preferable for this purpose, but propane or butane is quite satisfactory. Some operators prefer to

Recommended interference fit for valve seat inserts using wall thickness and outside diameters as coordinates.

TABLE II



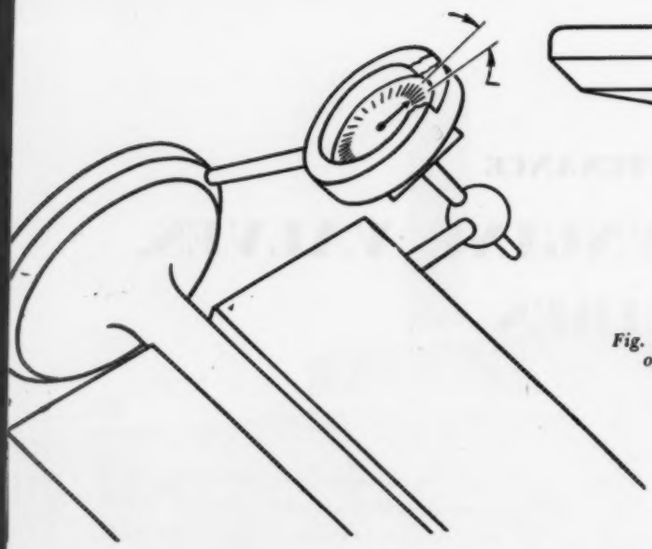


Fig. 1: Method of checking concentricity by means of dial test indicator.

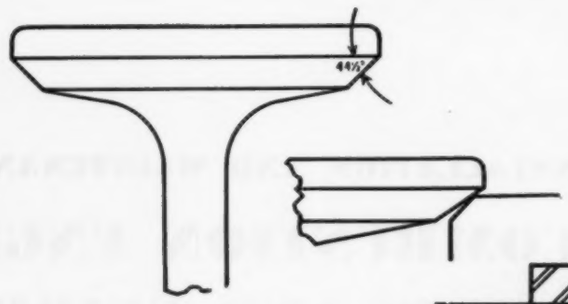


Fig. 2: Exaggerated view of facing operation described in text.

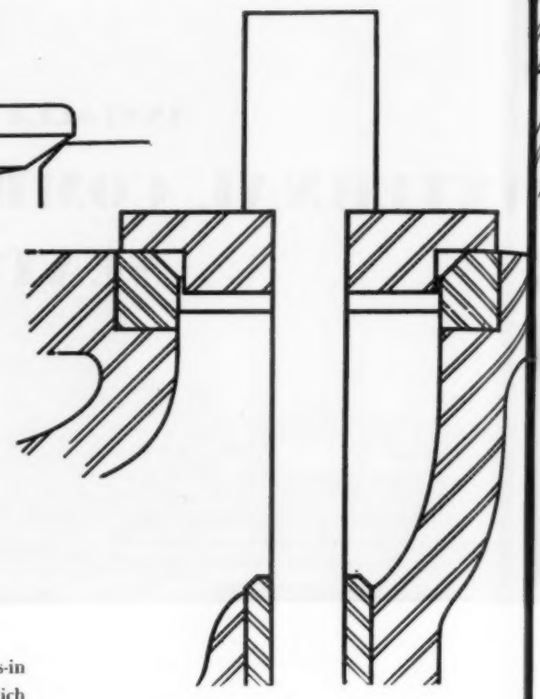


Fig. 3: Seat inserting tool made from steel bar stock and steel disk machined to proper size.

heat the cylinder heads, as well as to freeze the seats. If this method is used, the head should be heated in boiling water. Never use a blow torch or acetylene torch, as this may cause distortion and a resultant cracking of the head. The counterbore should be cleaned and the seats taken from the refrigerant as needed and installed with an installation tool, such as seen in figure 3. After the insert has been driven into the bottom of the counterbore, it should be allowed to set until it returns to normal temperature. Then the cylinder head metal should be peened lightly against the chamfer on the upper outside edge of the insert. This will eliminate the possibility of the insert becoming wedged under the valve head, should it loosen in the counterbore.

The insert is now ready for the seat angle grinding operation. Seats having face diameters up to 3¾ in. may be ground with a concentric type of automotive valve seat grinder. Seats above this size should be ground with a rotary grinder. Both types of equipment are capable of grinding seat face angles to within one-thousandth of an inch of concentricity between seat and guide.

After the seat angle has been ground true to the guide within the required limits, it should be checked against the valve to assure that the angle is correct and is matching the valve face in the proper proportions. This may be accomplished by smoothing a thin coating of Prussian Blue on the face of the valve and rotating it on the seat without pressure, or by lapping it in lightly with a very fine-grade water soluble valve grinding compound.

Considerable difficulty has been experienced by many operators in removing the press-in type of seat inserts. There is a method which is very effective in removing inserts which have a relief or bevel on the lower inside edge. This method requires a piece of hardened square steel of the proper size, cut off to a length just slightly above that of the inside of the insert, as shown in sketch 4. In removing the seat with this tool, it should be rotated slightly after each blow to prevent any chance of cocking or tipping the seat in the counterbore. A reversible gear puller may also be used on the above type seat.

VALVE GRINDING

Great care must be exercised when lapping in steel valves on steel seats with grinding compound, as steel rubbed against steel without lubrication between them has a tendency to gall and will cut small grooves in the valve or seat face. Before the introduction of the larger size valve seat grinder, it was frequently necessary to do considerable hand grinding with compound on the valve and seat to bring the seat in line with the guide. Consequently, many service men acquired the habit of driving the valve with a power tool and applying extreme pressure to make the abrasive compound cut faster. This practice should be discouraged. If the valve must be lapped in with compound, it is recommended that it be rotated against the seat by means of a tap wrench or lathe dog, fastened on the end opposite the valve head. No more pressure should be exerted against the valve head when lapping than the weight of the valve itself. The abrasive compound should be changed frequently and the old compound removed from the valve and seat before new is applied. The procedure outlined for installing press-in seat inserts may also be used to good advantage on cage type seats, although it is not essential that the seats be shrunk before installation of the cage. On engines having valves in removable cages, it may be found preferable to grind the seats after installing the cage in the cylinder head. This method eliminates inaccuracies caused by distortion which may occur between the seat and guide due to the cage hold down bolts being unevenly adjusted.

VALVE GUIDES

Next of importance to the valve and seat in the mechanism of an engine is the guide. Proper clearance between guide and valve stem, and alignment with the valve seat, have already been stressed previously, so I will deal briefly with installation. First, the guide bore in the cylinder head, block or cage should be checked to ascertain if it has become worn. Then measure the fit diameter of the guide to determine if it has the proper interference fit in the bore. A safe rule to follow here is to allow one-thousandth inch fit for each inch of fit diameter of the guide. It is desirable to have the guide extend well up toward the valve head, but it is most important that a thin wall section is not allowed to extend unprotected into the open exhaust flame. If so, the thin section will tend to curl as the exhaust flame sweeps across it, and will cause valve sticking and leakage.

Some cage type engines do not have removable valve guides. However, in most cases it is no

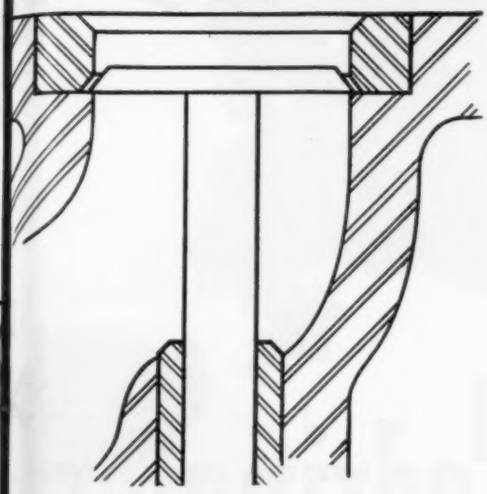


Fig. 4: Tool for removal of valve seat inserts.

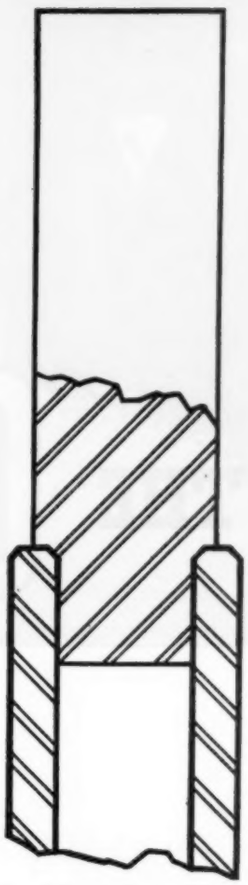


Fig. 5: Driving tool for valve guide bushings.

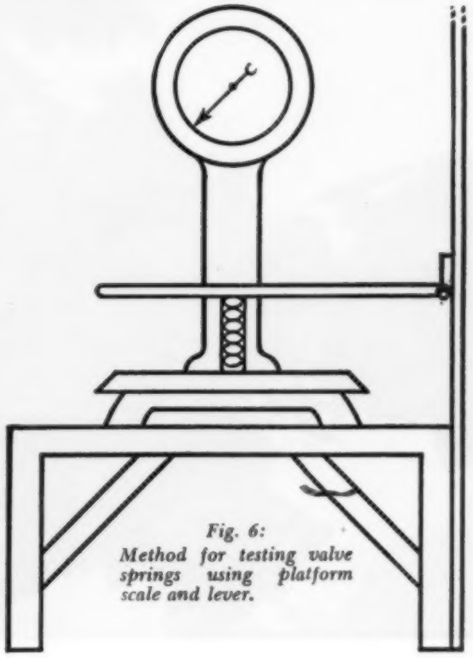


Fig. 6: Method for testing valve springs using platform scale and lever.

big problem to bore these out to accommodate bushings having a wall thickness of from 1/8 in. to 1/4 in. On unusually long cages it is desirable to install two bushings with a total length somewhat less than the length of the cage. A bushing should be pressed in each end, leaving a space between the two in the center of the cage for an oil pocket. This method also lessens the chance of the valve sticking in the guide due to cage distortion. In lieu of a press, bushings may be inserted by using a driving tool made from a round steel bar slightly smaller than the outside diameter of the guide or bushing, as pictured in Figure 5.

Probably the most effective, and least injurious valve guide lubrication is a 50% kerosene and 50% upper cylinder oil solution. It has been my experience that under lubrication of valve stems is more desirable than over-lubrication, as valve stem and guide wear are preferable to a burned valve which may result from a gummed, sticking stem.

VALVE SPRINGS

The most common valve spring trouble in the slow speed industrial engine is breakage and hammering out of the valve seat, the latter caused in most cases by a spring which is too weak. It has been observed that ofttimes spring breakage occurs when an engine is operated at a fixed speed, such as on generator drives. In many cases, this may be due to a vibration harmonic set up in the spring, which eventually causes fatigue failure. Considerable experimentation may be necessary to eliminate such harmonics. A stronger spring, one having a greater, or lesser, number of coils. Where two springs are used per valve, it is very important that the lead winding of the inner and outer springs go in different directions. On cam operated valves the travel of the valve will exactly follow the contour of the cam, if the valve spring is sufficiently strong, and it will strike the seat with only the force developed in the space provided for rocker arm or tappet clearance. On the other hand, if a sticky valve is operated with a weak spring, the cam may leave the valve, and when it finally closes, will strike the seat with considerable impact. Valve springs should be checked for compression pressures at the time of each valve servicing. One checking method is shown in Figure 6. Springs which show more than 10% variation under the compression pressure of a new spring should be replaced.

Table I.

AVERAGE CLEARANCE

Valve Stem Dia.	Inlet	Exhaust
1/2	.002"-.004"	.003"-.005"
5/8	.0025"-.0045"	.004"-.006"
3/4	.003"-.005"	.005"-.007"
7/8	.004"-.006"	.006"-.008"
1	.0045"-.0065"	.007"-.009"
1 1/8	.005"-.007"	.008"-.010"
1 1/4	.0055"-.0075"	.009"-.011"
1 3/8	.006"-.008"	.010"-.012"
1 1/2	.007"-.009"	011"-.013"
1 5/8	.0075"-.0095"	.012"-.014"

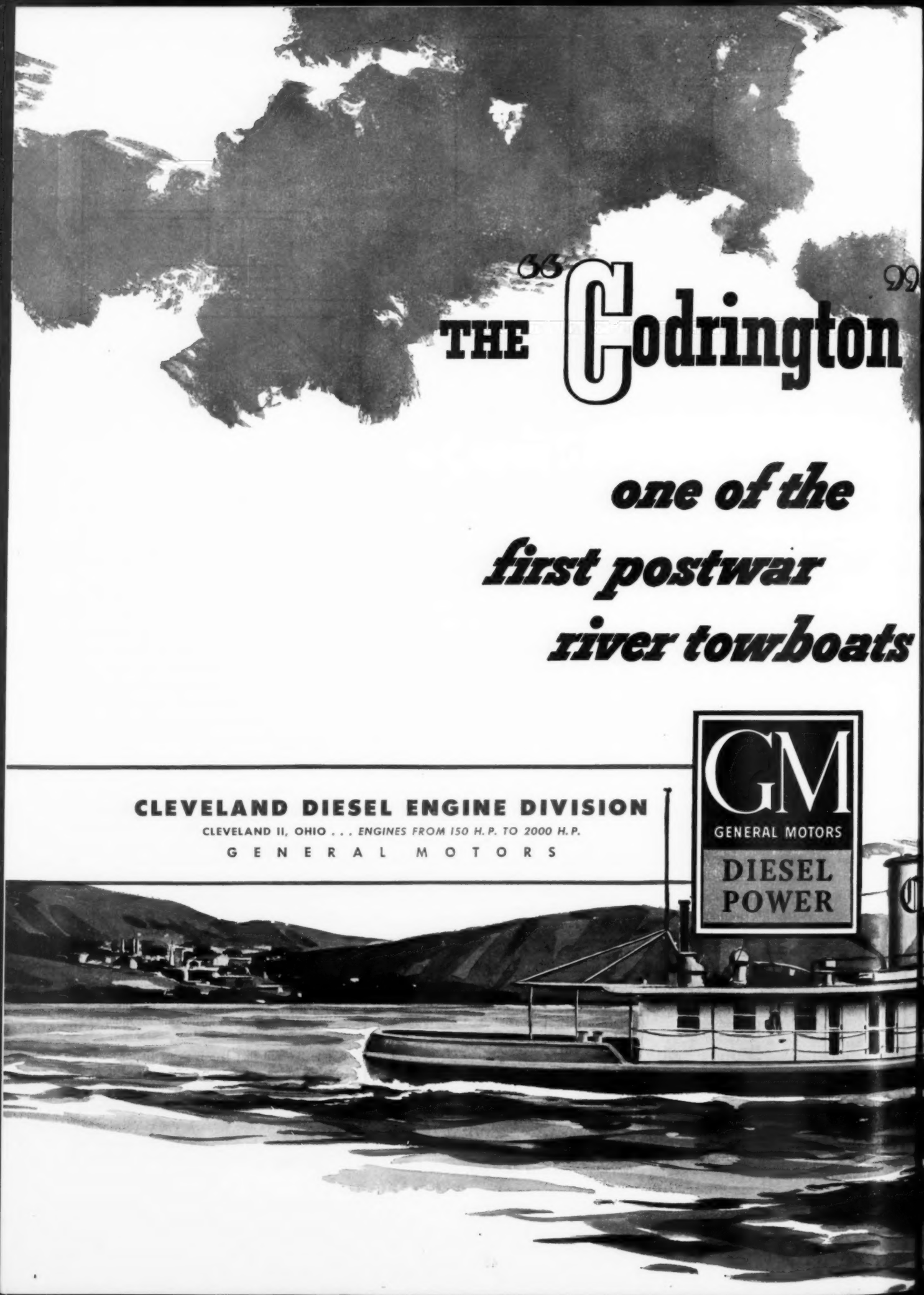
Recommended clearances for valves of various stem diameters.

EXHAUST VALVE TIMING

Exhaust valve timing in the four cycle engine has a very important bearing on both operating efficiency and life expectancy of valve parts.

As wear manifests itself to a greater extent in the exhaust than in the inlet mechanism of the four cycle engine, the operation of the exhaust valve is often thrown out of synchronism with the piston travel when engines are timed by the inlet valve only. The answer is the timing of four cycle engines by the exhaust valve, using the exhaust curve of the light spring indicator diagram as a checking medium.

I might add that late ignition timing can be much more injurious to exhaust valve parts than early ignition, due to the fact that the burning gases, following the piston on the power stroke, escape through the exhaust valves before they have cooled by the process of expansion.

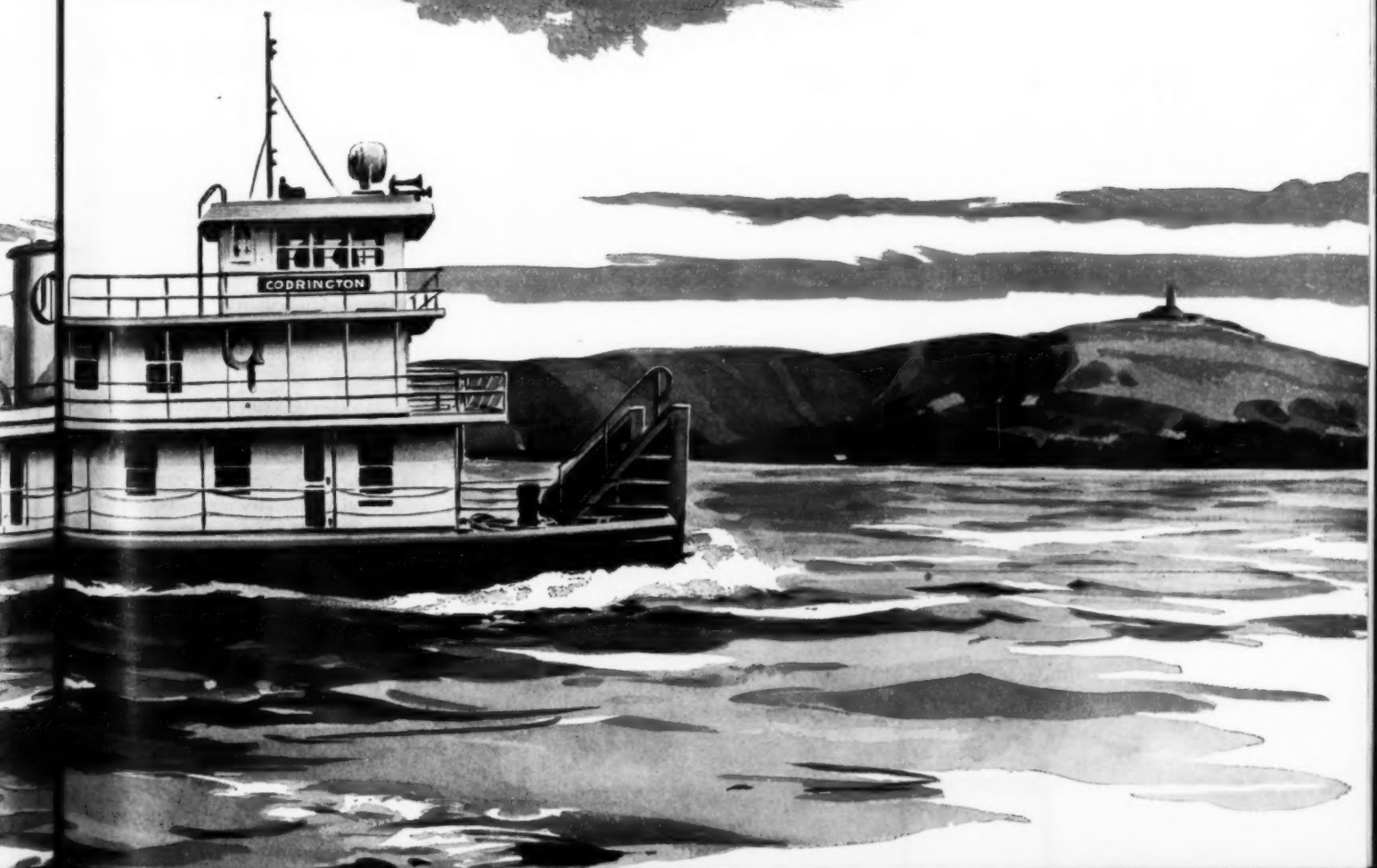

"THE Codrington"
one of the
first postwar
river towboats
CLEVELAND DIESEL ENGINE DIVISION
CLEVELAND 11, OHIO . . . ENGINES FROM 150 H.P. TO 2000 H.P.
GENERAL MOTORS
GM
GENERAL MOTORS
DIESEL
POWER

The Canal Barge Company's new towboat, the "Codrington," designed and built by the Nashville Bridge Company, Nashville, Tenn. plies the Mississippi River. Her job is moving oil barges from the Gulf a thousand miles upstream.

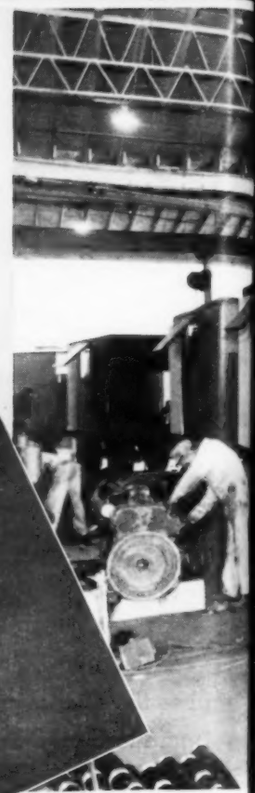
And like so many military and previous commercial craft, the "Codrington" is powered by General Motors Diesel engines.

With all their dependable ruggedness, these engines are compact and lower in weight than usual Diesels. This means more room for cargo, passengers or fuel.

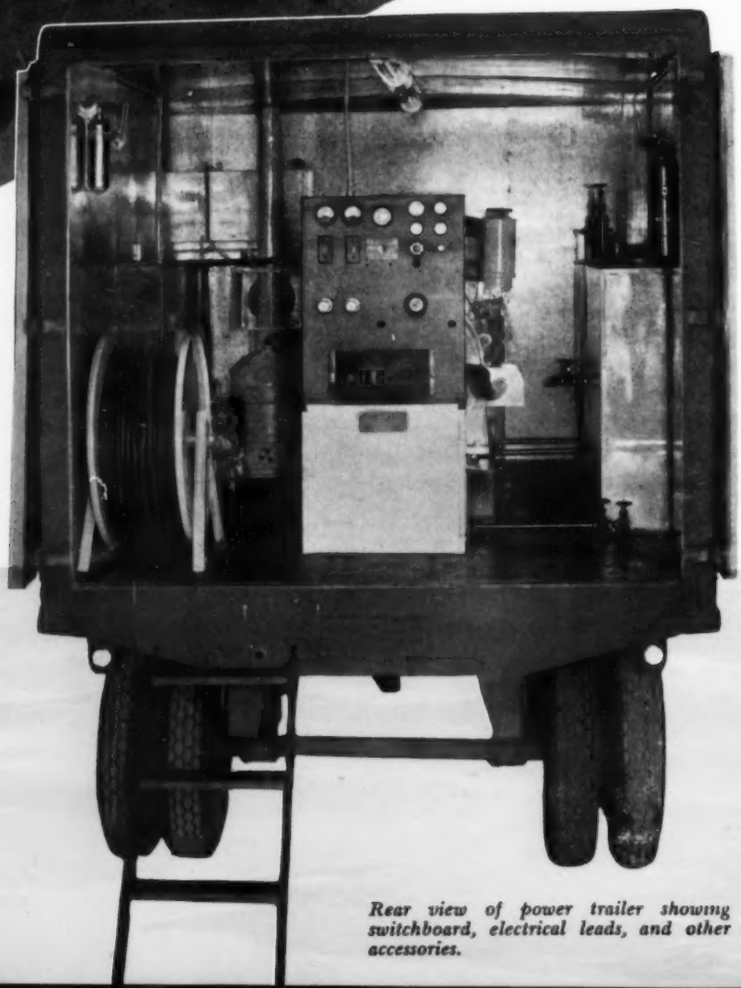
And with their ready response to their controls, these engines provide an extra measure of maneuverability.



General Motors Diesel engine and generator being assembled prior to trailer installation.



Stewart and Stevenson trailer production line i swing.



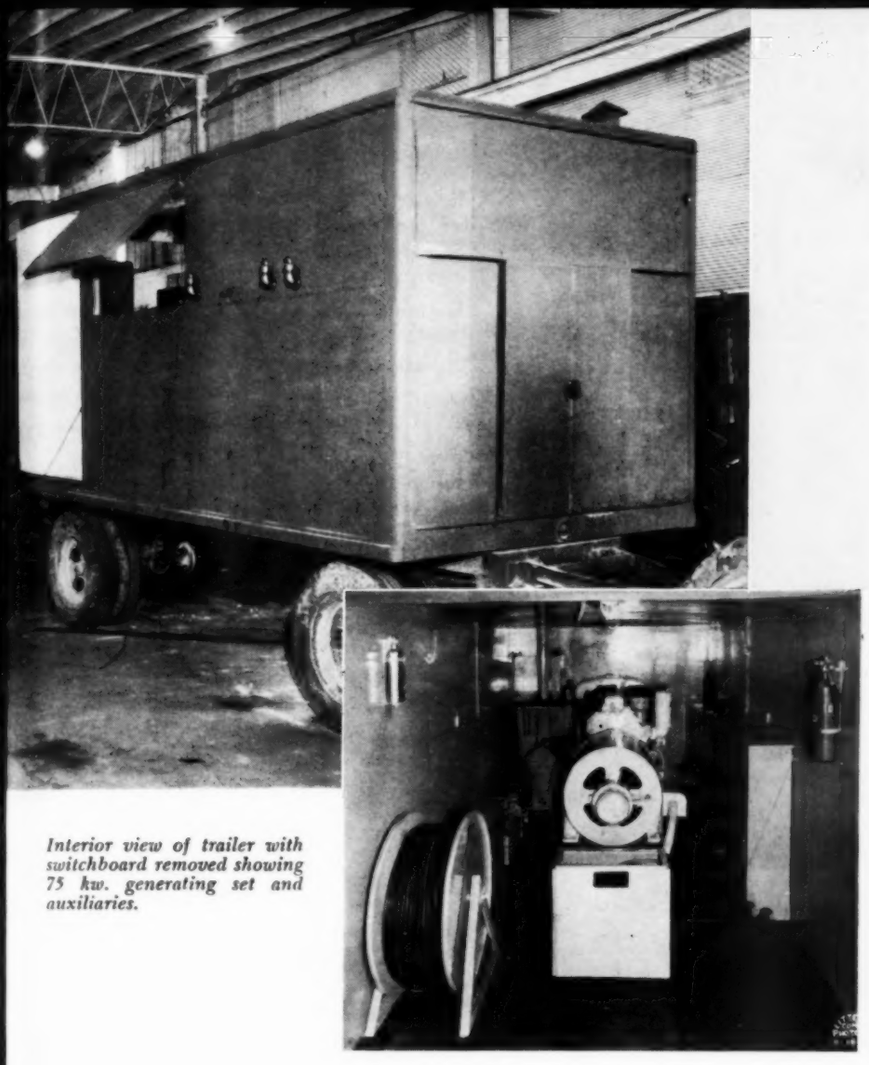
Rear view of power trailer showing switchboard, electrical leads, and other accessories.

STEWART AN TEV

WHEN General Motors started building the 71 series Diesel engine back in 1938, a Texas firm, Stewart & Stevenson Services, Houston, saw the possibilities of this new endeavor, and acquired the distributorship for General Motors Diesels for the Southeast section of the Lone Star state.

With this country's entry into the war, Stewart & Stevenson were soon called on to fabricate both Diesel and gas driven generator sets for the U. S. Army Signal Corps to be used in connection with a very urgent program. This was in early 1942. And with the production of a great number of these generator sets which were used extensively in the African campaign, Stewart & Stevenson began their manufacturing endeavors.

This same year the company was invited by



Interior view of trailer with switchboard removed showing 75 kw. generating set and auxiliaries.

AN TEVENSON (*Diesel*) SERVICES

the Treasury Department to bid on a new type of portable Diesel-driven generator set to be operated in temperatures of 40 degrees below zero. (F), and to burn European M-4 fuel, which is so heavy that it congeals in low temperatures. Stewart & Stevenson engineers developed a method of heating the engine, the fuel, and crank case oil for starting in extremely cold weather. Also a method of burning low grade M-4 fuel was perfected, with the result that Washington ordered 35 of these units. The results were so satisfactory, that Stewart & Stevenson were assigned production of 1,000 Diesel-driven generator sets for European use.

The 35 kw. capacity of the first plants was stepped up to 400 kw. which is the output of the ones now under construction at the company's manufacturing and fabricating plant at Houston.

The story behind the development of these generator sets is one of tedious fact-finding, of trial and error, of endless research, of exhaustive testing, eliminating and testing again. From the time that the first pilot model had passed its test until the present power unit was perfected, the costs per kw. were cut in half without materially increasing the weight or the outside dimensions of the units. The power stations are used to furnish electric current both three phase and single phase, for electric motors, electric lights and all other types of electric appliances. The units can also be used for temporary power where main line electrical facilities have been destroyed or damaged.

The list of Diesel-driven power units fabricated by Stewart & Stevenson for the armed forces is long and varied. Just a few of the outstanding jobs are: 50 special Diesel-driven generator sets for the Navy for use aboard navy repair ships . . . 150 automatic Diesel-driven generator sets installed in American tankers for the U. S. Maritime Commission . . . 202 specially built light-weight 75 kva. Diesel generator sets for the United States Army Air Forces for use in tropical climates.

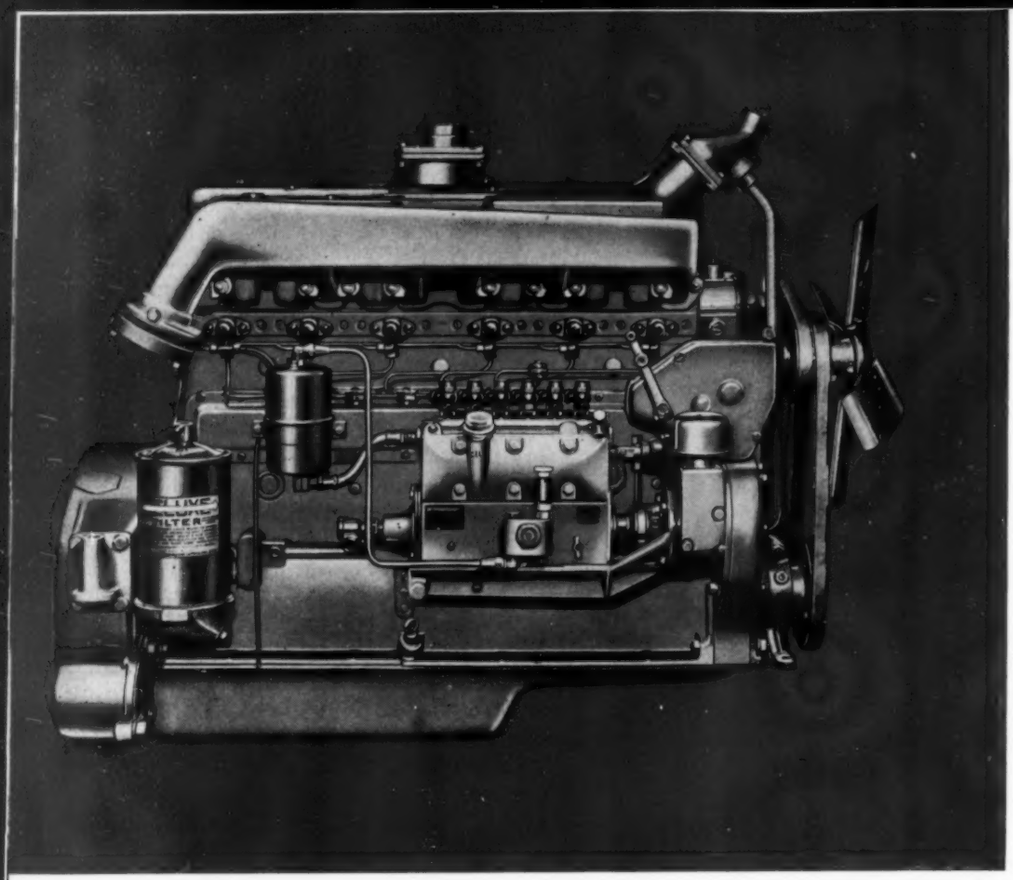
One of the developments which came about because of war necessity is Stewart & Stevenson's Diesel "re-manufacturing" plant. This unusual department of Stewart & Stevenson came into being when the company took on a rush assignment of re-manufacturing 3,336 Diesel engines for M-10 tank destroyers. This was at the time of the Belgian Bulge, when our land forces needed this equipment desperately.

The contract called for a back-breaking schedule of rushing the worn tank engines from Warren, Ohio, from Schenectady, New York, and from Montreal, Canada, to Houston, where they were re-manufactured, and rushed back to these cities for installation. The re-built tank destroyers were soon on the front lines in Europe, and took part in the campaign which saw the defeat of the German Army.

This was the largest Diesel engine rebuilding program that has ever been completed in the United States. With this experience as a background, the company's re-manufacturing plant soon had its hands full. Later, 1,750 jeeps were re-manufactured and shipped directly to the South Pacific. Still later, Stewart & Stevenson re-manufactured 319 pairs of tank engines that had been used in combat.

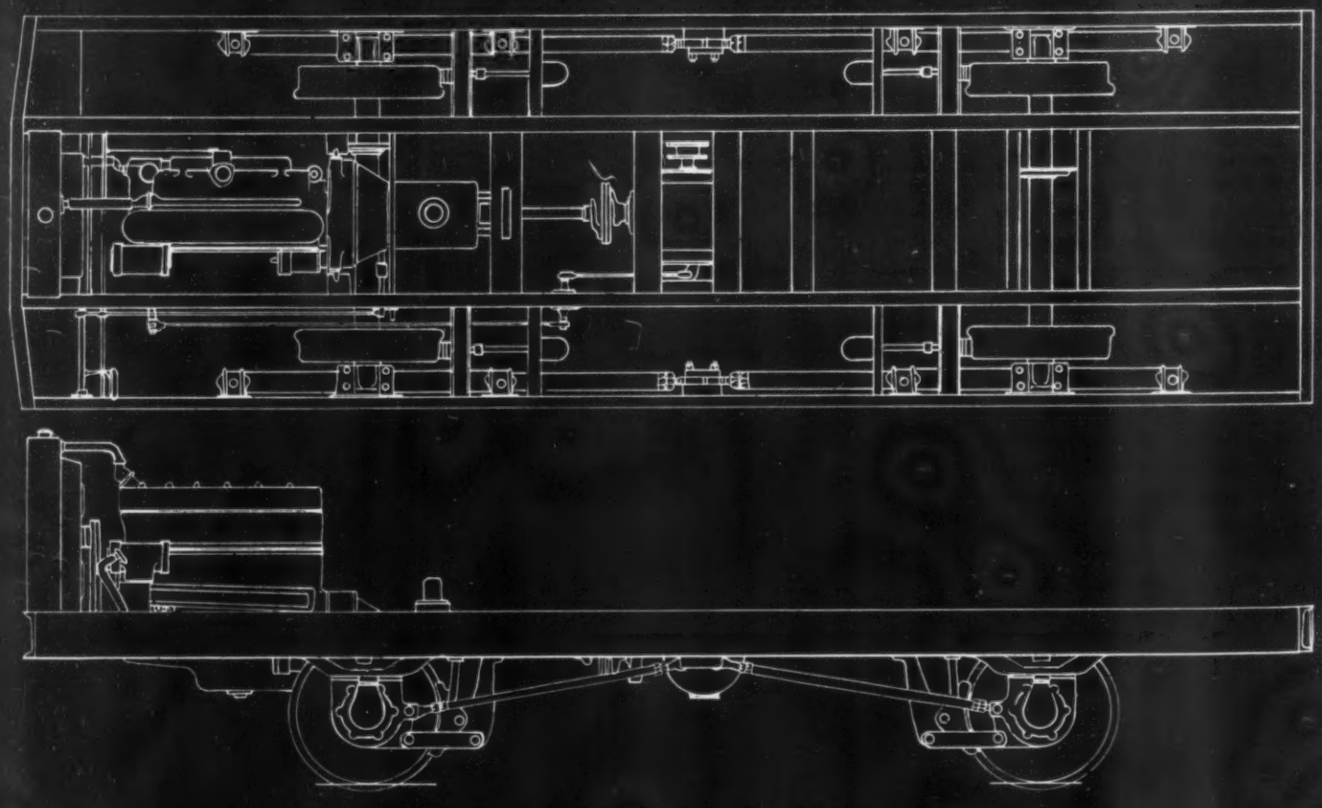
Today, with the invaluable experience of Diesel re-manufacturing behind them, Stewart & Stevenson have a re-manufacturing plant that works at full capacity. This is a new idea in the Diesel field, and as an introductory offer, the company has inaugurated a service whereby they completely re-manufacture Series 71 General Motors Diesel engines on an exchange basis, and will deliver anywhere in the United States. The main plant and general offices are located in Houston, where their large warehouse carries stocks of Diesel engines, and complete engine parts.

At present, the company is producing Diesel-electric units for shipment to the Dutch East Indies, Europe and South America. Specially designed power units for oil field use are produced for the oil industry. The company has also installed a large marine department for applying Diesel engines to various types of boats on the Texas Gulf Coast, including fishing craft, yachts, and tug boats.



Buda 6 cylinder, 85 hp. Diesel used to power the smaller model railcars.

BUDA ANNOUNCES A NEW LINE OF DIESEL RAIL CARS



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A NEW line of all-metal rail cars is now being manufactured by the Buda Company. They are in the latest streamlined designs and are available in various models seating from 6 to 64 passengers. Their Diesel engines, through mechanical, fluid or electric drives, supply adequate power for all types of operation as the horsepower available per car varies from 55 to 520 in the various models.

The bodies of these rail cars are up-to-date, being light in weight and yet sturdy, with safety features throughout. The entire construction is aimed at safety and comfort for the passengers. The body is doubly insulated against noise and climate. Power exhaust ventilators combined with other no-draft ventilation features make for passenger comfort. Seating and interior arrangements are utilized with variations to meet the requirements of individual operations. Special compartments for buffet, baggage, express, or toilet are available at any desired location.

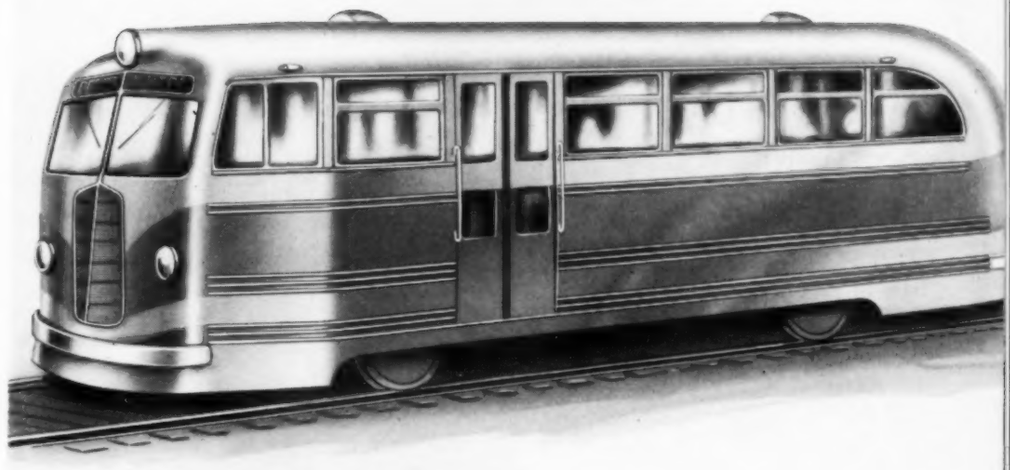
Vacuum booster operated shoe brakes are installed in every wheel and air brakes are supplied on the large models, with an air cylinder for each wheel.

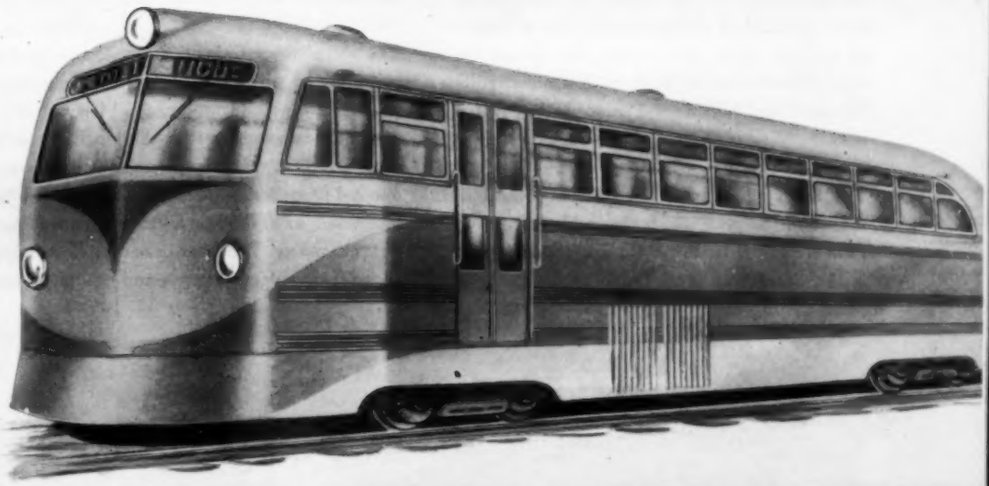
In any discussion of the mechanical aspects of these new cars, one must consider the startling absence of axles on the larger model cars. The four wheel axle-less trucks utilize two wheel tandem drive. Thus, there is no drive connection between the wheels on one rail and those on the other. This results in no loss of power because of wheel slippage on curves which occurs in axle driven equipment. Truck-mounted coiled springs operating in hydraulic cylinders insure riding comfort.

The engines on the large mechanical-drive cars are direct-connected to each side of the trucks through clutch, fluid coupler or torque converter and propellor shaft. Drive motors on the high speed Diesel-electrics are mounted under each side of the car frame and connected by propeller shaft to the truck as in the mechanical unit. The electric drive makes for quiet and easily controlled power.

As mentioned previously these cars are furnished with Diesels suitable for the power requirements of individual situations, such as terrain conditions, including grades and curves, and narrow or wide gauge installation.

The economy of Diesel operation should make these rail cars very desirable to American railways, both north and south of the border.





New 102 foot Diesel-electric tug "Coral Sea" now in service for the Interstate Oil Transport Company.

OIL HAULAGE IN CHESAPEAKE BAY AREA

By WILL H. FULLERTON

FOR over sixty years, interests connected with the Interstate Oil Transport Company, Philadelphia, Pennsylvania, have been engaged in tug and lighter service in the Chesapeake Bay and Delaware River areas. Having grown up with this particular branch of the marine business, their inland waterway and sea-going hauling experiences have been unusually wide and extensive. In the early days, their operations consisted of transportation of dry cargoes by sail and steam; but, as the years passed by, water movements of bulk petroleum steadily increased and became the company's principal work.

The latest addition to the company's fleet of tugs and barges, which recently arrived at Philadelphia from the builder's yard in Texas, is the *Coral Sea*. This sea-going electric-drive Diesel tug, constructed by the Gulfport Boiler and Welding Works, Port Arthur, Texas, is 102 feet long, with 24-foot beam and a.m.d. of 10 feet, 8 inches. Operated by the Interstate Oil Transport Company in Chesapeake Bay and on the Delaware River, the *Coral Sea* also will ply on the Atlantic Coast as far South as Savannah, Georgia, hauling oil for both major and independent oil companies.

The *Coral Sea* came up from Texas on her maiden voyage towing one barge and returned to fetch two new 18,000-barrel oil barges, which will form her regular tow. Although the company now operates five Diesel-engined tugs and one self-propelled lighter, the *Coral Sea* is their first vessel to have electric transmission of propulsion power. Their experiences have made them keen judges of types and makes of propelling engines, and there is every indication that their latest selection of machinery will result in full satisfaction.

But here is their best indication of the results they will obtain. Any owner knows that towing off the Atlantic coast in rough winter weather is a strenuous job for any seasoned tug which has had all the teething troubles knocked out of it. The *Coral Sea* already has provided them with an instance where a long off-shore ocean haul has been carried out in fine shape by a new vessel on her initial run.

From Port Arthur to the Delaware—a trip of some 2,300 sea miles—took but 12½ days, ploughing against moderate to fresh head winds the entire way outside, and encountering some very heavy seas.

Due to a heavy storm off Cape Hatteras, the *Coral Sea* and her tow lay in Moorehead City, North Carolina, for twenty-four hours. Also, she anchored for one night in Chesapeake Bay because heavy rain had reduced visibility to a danger point. Otherwise the trip would have been made in eleven days, regardless of unfavorable conditions.

While it is not possible to calculate the exact quantity of fuel consumed by the main engine on the trip from builder's yard, the total amount of oil used for all purposes, including the auxiliary Diesel, battery charging, lights, ship's heating, for cooking and hot water service and the generation of power for the steering engine, was 16,000 gallons of Navy No. 4 Diesel oil. All items are supplied from the same day tank, so individual checking is not feasible. On the trip, the propeller turned at 170 to 180 rpm. and the engines were run at about 80 per cent of full load.

The *Coral Sea* is under the command of Captain Alton Bowen, with J. H. Leo as mate; Kristian G. Nelson, chief engineer; and Arthur J. Anderson, first assistant engineer. Hugo Kluever, resident engineer for Cleveland Diesel at Port Arthur, was aboard in the capacity of guarantee engineer.

The basic design of this tug came from the drawing board of the late George Drake, New York naval architect, and over 100 of these tugs, in modified and developed form, have been built for the United States Navy during the war, including the Diesel-propelled tug *Intent* that was rushed to the Red Sea and became famous in salvage work. The present design has been well-tried and proven.

The main engine of the *Coral Sea* is a General Motors 12-cylinder, V-type, two-cycle Diesel, rated 1,200 bhp. at 750 rpm. It is coupled to an 814-kw., 700-volt, 1160-amp. generator, which supplies current to an electric propelling motor turning at 875 rpm., and driving the propeller shaft through reduction gears. The engine has port scavenging-air inlets and valve-in-the-head exhaust outlets, scavenging being effected by means of a blower mounted at the forward end of the engine and delivering the air under low pressure to the combustion chambers.

The main engine and generator together are under 25 feet in length, and approximately 6 feet in width, which gives more than ample room for the engineers to work. There is considerable auxiliary equipment, but under no circumstances could the engine room be termed "crowded." In fact, the reverse is the case, for there is a surprisingly large amount of free space, particularly when compared with a steam installation.

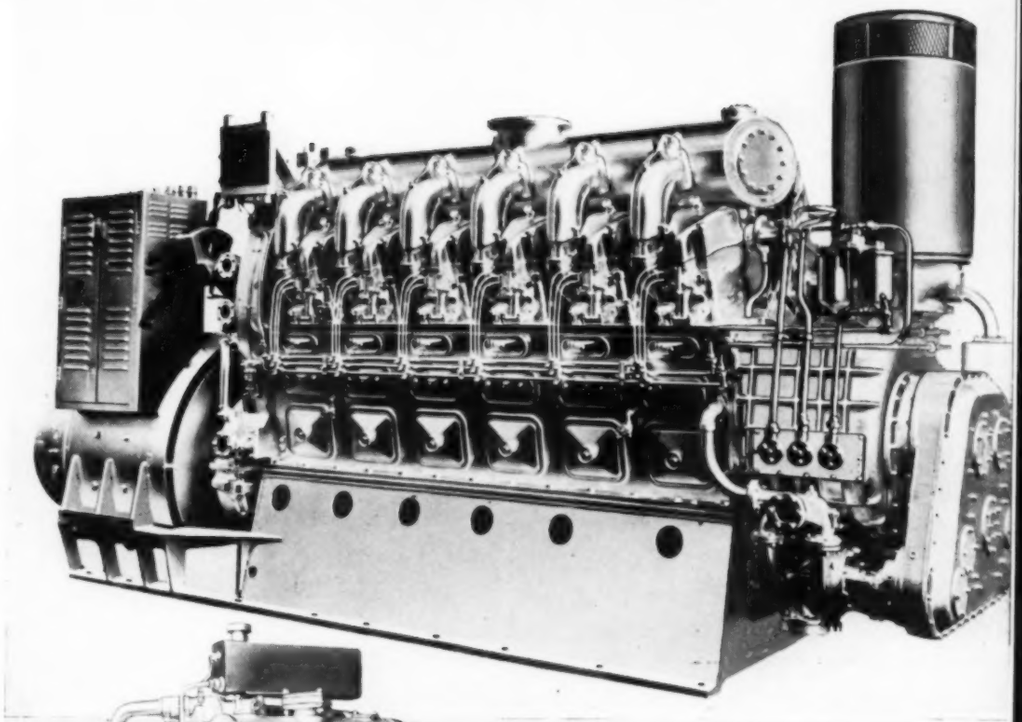
On the bulkhead forward of the main engine are the engine-water and engine-oil coolers. On the port side of the engine room are motor-driven fuel oil transfer pumps of the rotary type; the motor-driven air compressor for the ship's siren; a dead-front type switchboard; and oil-fired boiler for the ship's heating and hot water supply, as well as a large installation of electric storage batteries. A group of 60-volt batteries supplies power for starting the main engine and furnishes current to the main generator which is used as a motor when starting from cold or stand-by. The other group of 120-volt batteries provides power and light in port, when the auxiliary Diesel is shut down. Also on the port side is a large motor-driven ventilating blower for the engine room.

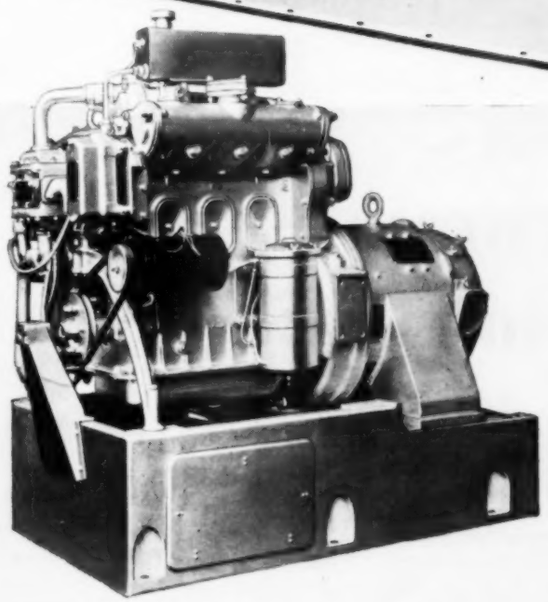
On the starboard side of the engine room, there is a motor-driven fresh water pump and tank, a bilge pump and lube oil pump, all equipped with electrical controls. Next aft is the lubricating oil clarifier. Then comes the auxiliary Diesel generating set. This is a General Motors 30-kw., 45-bhp., two-cycle, three-cylinder Diesel-driven unit. Aft again is a small workshop, alongside of which is the main engine propulsion motor. Abaft of the motor is the electric steering engine.

On the engine room flat, aft, and over the propulsion motor, are two cabins with toilet and shower between. One is for the chief engineer and has a spare bunk, while the other is for the second and third engineers. Forward of the engine room is the combination galley and mess room, fitted with oil-fired range, refrigerator and cold storage. It is served by one cook. The crew's quarters in the forecastle has sleeping accommodation for six men; but only three seamen are carried. Over the crew's compartment are cabins for the two mates and the cook. Accommodation for the captain is in the cabin aft of the pilot house. In an alcove office of the captain's cabin is a ship-to-shore radio telephone which he operates, no radio operator being carried.

The quick and easy pilot house control, which Diesel-electric drive permits, unquestionably affords a tug's captain great navigational advantages over the old system where he had to telegraph "reduce speed, half speed, stop or reverse" to the chief engineer below. Now, he has instant rsponse from the movement of his own hands, and does not have to put up with the few-seconds loss of time required for the operator to rush to the control station, acknowledge the signal and maneuver the engine. And, the engineer is left free to attend to whatever task he may be engagd in when engine maneuvering is suddenly required.

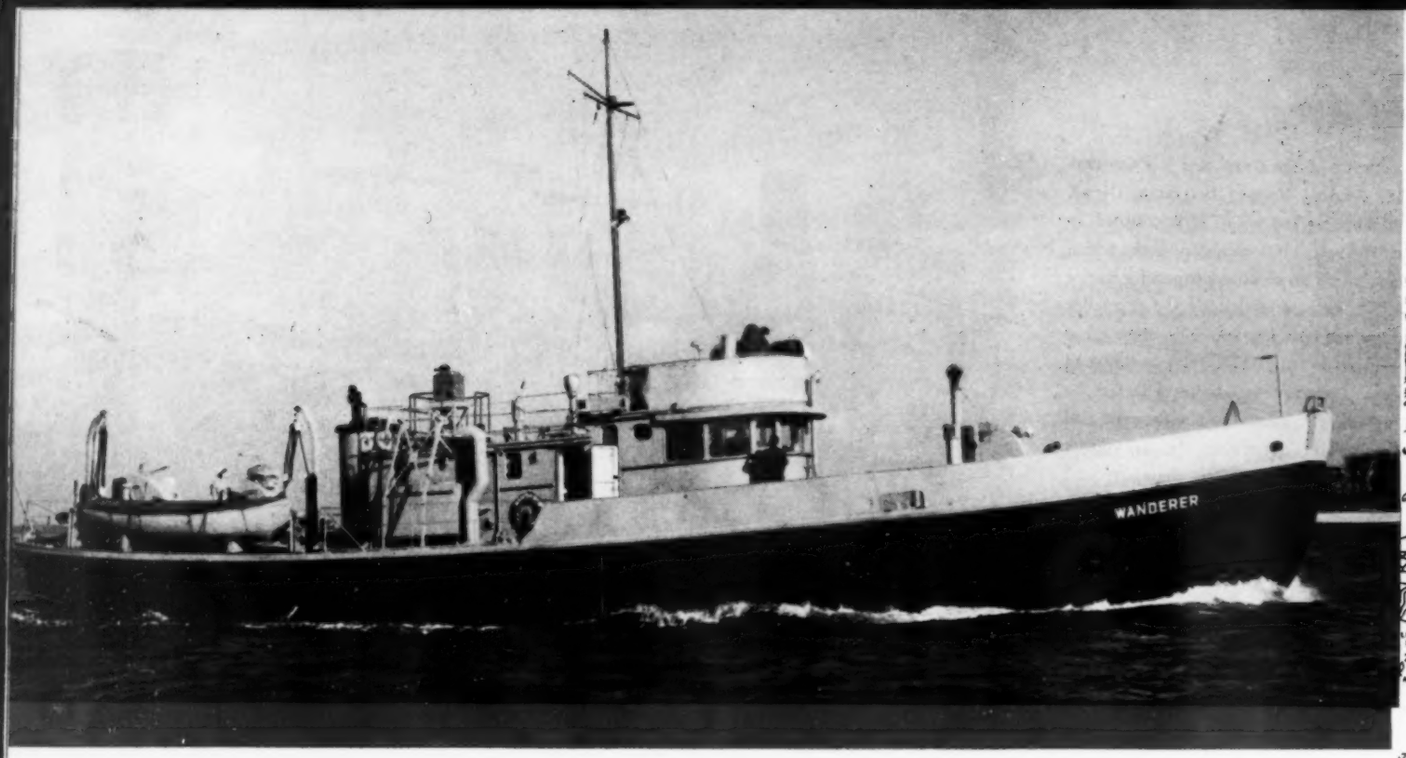
It is reasonable to expect that the *Coral Sea* will continue to give the same fine service she gave on her maiden trip and that her owners will have a craft which will do better work at lower transportation cost than any of their existing tugs. This, in terms of dollars and cents, is the crux of towboat operation under competitive conditions.





"Coral Sea" has one of these General Motors 1200 bhp. 750 rpm. Diesels for her main engine.

A 3-cylinder 45 hp. Diesel auxiliary supplies the ship's service power needs of the "Coral Sea."



SPERRY DEMONSTRATES NEW RADAR ON LABORATORY-YACHT "WANDERER"

By BRUCE C. SISSON

A NEW era in marine navigation was inaugurated recently when the new Sperry marine radar was demonstrated to a group of marine editors in an actual test on board the Diesel yacht *Wanderer,* the Sperry Gyroscope Company's floating laboratory.

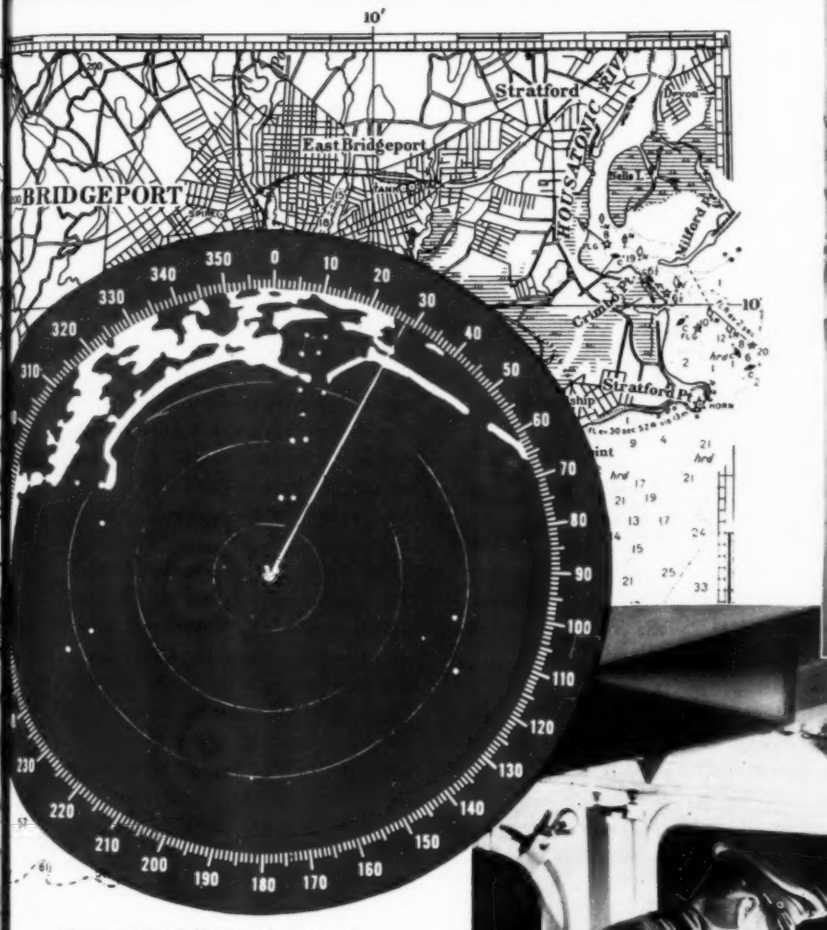
The navigator, Omar B. Whitaker, Sperry Marine Sales Manager, accepted zero visibility conditions as he stepped into the curtain-enclosed radar booth when the ship was a mile off the channel entrance of Bridgeport Harbor. From his position in the enclosed booth, Mr. Whitaker guided the 101 foot *Wanderer* through the narrow channel with the greatest of ease using only radar in giving orders to the wheel. When the ship had passed squarely between the first two buoys, observers on deck noted a lobster pole in the channel ahead. Wondering if the radar had picked up this obstruction, they found that this 1½ inch diameter pole, protruding perhaps four feet above the surface, made a distinct pip on the radar screen and had been neatly avoided by the navigator in his approach. After seeing this the party forgot any qualms they might have had about radar for blind piloting and watched with admiration as the ship went cleanly through the remainder of the channel.

The new Sperry radar includes refinements not found in other ship borne equipment. By utilizing the repeater system of the Sperry Gyro-Compass installation the radar scope gives true bearings. The course line of the ship appears on the screen in its true bearing. As Mr. Whitaker said, "We have designed and built this equipment from the standpoint of the people who will have to use it. It is not necessary with the true indicating radar for the operator to wait until his radar screen clears every time his ship's course is altered. It shows the ship's heading with north always at the top, just as he views his chart."

Mr. Whitaker pointed out that the new Sperry equipment meets all requirements of the Coast Guard's Class A specifications. By utilizing a wave length of 3 centimeters, the same as was used for Sperry's airborne equipment, Sperry radar operates with a 4 foot reflector scanner thus getting the results that would require a 12 to 14 ft. reflector with ordinary 10 c.m. equipment. Since the reflector is mounted high on the ship and is subject to wind resistance, it is a great advantage to keep antennae small. The Sperry radar consists of a rotating antenna assembly, or scanner, which is placed on top of the ship's wheelhouse; a viewing binnacle installed in the wheelhouse; and a "transceiver," containing the "brains" of the equipment which can be installed below decks in a convenient location.

The operation of the scanner is entirely automatic, its rotation being controlled by the on-off switch on the binnacle. High frequency impulses are transmitted from the reflector on the rotating antenna for a quarter of a microsecond. These impulses reflect against all objects on or above the surface of the water and return to antenna and transceiver and finally are "seen" in the PPI scope.

With this equipment it is possible to cover a



Photograph of Radar viewscope in operation, superimposed on pilot chart of Bridgeport Harbor. Ship's heading is shown by radius line from center. Small white dots represent channel buoys.

Top: Compact Loran or Long Range Navigation system installed on "Wanderer." It is an electronic navigational device. Lower picture shows the Radar binnacle installation in the 'Wanderer's" pilot house. Note the large 12 inch viewscope. For operational purposes the binnacle may be curtain-enclosed.

radius of 40 miles. For closer operating ranges, scales are included with 2 and 10 mile radii which permit more accurate range calibration.

The *Wanderer* is probably one of the most completely equipped laboratory vessels in existence. Two Sperry Gyro-Compasses—Mark XIV and Mark XVIII, a Sperry Gyro Magnetic Compass, electro-mechanical steering gear, a rudder angle indicator and a course recorder and Loran, the electronic navigation device, completes this list of navigational equipment.

The *Wanderer* was built originally as a yacht for R. W. Allen and was one of the first with Diesel electric drive installed. Two Cooper-Bessemer Diesels, 360 hp. each, driving two 200 kw. 750 rpm. generators supply two 250 hp. electric propulsion motors which propel the ship through a Farrell reduction gear and a single 72 inch screw. Engine controls are mounted in the pilot house. Ships service electricity is furnished by the main engines which drive two 50 kw., 125 volt generators which are mounted on the shafts of the main generator. Auxiliary power is supplied by a 10 kw. Reiner generator set powered by a 4-cylinder Hercules Diesel. Starting air is supplied by two Ingersoll-Rand type 3 compressors. Each main Diesel is equipped with Woodward governors and Fulflo filters by the Commercial Filter Corporation of Boston, Massachusetts. Max Hoer, who is in charge of the *Wanderer* says that during the period of her operation with the Coast Guard during the war, the *Wanderer* towed a disabled Liberty ship into port at 8 knots. This is quite a showing of the little vessel's power.

18th ANNUAL OIL & GAS POWER CONFERENCE AT MILWAUKEE, JUNE 12-15

Railroad Diesels—Gas Turbines— Gas Diesels To Be Featured

THE Oil and Gas Power Division of A.S.M.E., resuming a practice interrupted in 1945 by reason of the government ban on conventions, will hold its 18th National Conference on June 12-15, 1946, at Hotel Schroeder, Milwaukee, Wisconsin. The newest developments in Railroad Diesels, Gas Turbines and Gas Diesels will be featured in the technical sessions of the conference.

Because of the excellent possibilities for worthwhile plant inspection trips in Milwaukee and vicinity, but one afternoon session will be held, on opening day, Wednesday, June 12. Trips will be made on all other afternoons, and the innovations of simultaneous technical sessions on Friday and Saturday mornings and an evening session on Friday, have been planned to accommodate the many important papers scheduled.

The Diesel Engine Manufacturers' Association will cooperate with the Oil and Gas Power Division by sponsoring the program of the banquet to be held on opening day. E. J. Kates, Division Chairman, will preside at the banquet and introduce E. J. Schwannhauser, DEMA President, who in turn will call on executives of the industry for short talks on the outlook for Diesel engines in the various fields of application.

Other social events are also planned. A luncheon on opening day, midday social hours on Thursday and Friday, and one of the famous O&GP social evenings on Thursday, have been arranged for. A short talk on the "History of the Diesel-Electric Locomotive" will be a feature of the Wednesday luncheon.

As at past Conferences, manufacturers of Diesel engines and accessories will show their products in numerous, attractive booths in close proximity to the meeting rooms. As we go to press the exhibit space is nearly filled and the list shows many new developments to be displayed.

Under the guidance of Robert Cramer, a special committee of the A.S.M.E. Milwaukee Section of which T. E. Wetzel is Chairman, is making arrangements for the sessions, inspection trips and social events. Bruno V. E. Nordberg will be Honorary Chairman of the Conference; general details are in charge of E. J. Kates and L. N. Rowley, Chairman and Secretary respectively, of O&GP Division and R. Tom Sawyer, Chairman of the Meetings and Papers Committee.

A tentative schedule of the complete Conference follows:

WEDNESDAY, June 12

10:00 A.M. Registration

12:00 N. Luncheon—"History of Diesel-Electric Locomotive," by L. G. Coleman

2:00 P.M. Technical Session—
"Ten-Year Progress Report on International-Combustion Engines," by R. B. Rice
"Diesel Engines for Peak-Load and Standby Service," by A. C. Kirkwood

6:00 P.M. Exhibitors' Social Hour

6:30 P.M. Banquet (Informal)
Presiding Officer: E. J. Kates
Toastmaster: E. J. Schwannhauser
Speakers: R. H. Morse, R. E. Friend, C. E. Brindley, A. W. McKinney and W. T. Crowe

THURSDAY, June 13

9:30 A.M. Technical Session—
Symposium on Gas-Diesel Development: with Emil Grieshaber, Ralph Miller, Ralph Boyer, C. E. Cox and J. C. Barnaby

12:00 N. Social Hour

2:00 P.M. Inspection Trip: Nordberg Mfg. Co.

8:00 P.M. Social Evening

FRIDAY, June 14

9:30 A.M. Technical Session (Gas Turbines)—
"The Gas Turbine as a Land Power Unit," by A. D. Hughes
"Metallurgical Considerations in Gas Turbines," by N. L. Mochel
"An Exploratory Excursion into Patents Concerning Gas Turbines," by E. M. Fernald
Technical Session (Diesel Engines)—
"A New System of Turbocharging," by Ralph Miller
"Diesel Combustion Temperatures—The Influence of Operating Variables" by Uyehara, Myers, Watson and Wilson

12:00 N. Social Hour

2:00 P.M. Inspection Trip: Allis-Chalmers Mfg. Co. (Gas Turbines, Jet Propulsion)

7:30 P.M. Technical Session—
Symposium on New Railroad Diesel Engines: with J. H. Davids, H. Bohuslav, Ralph Miller, George Noltein, Ralph Boyer

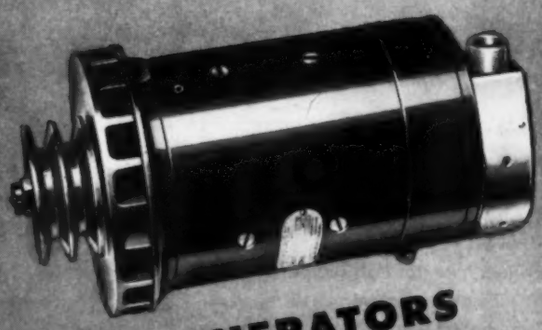
SATURDAY, June 15

9:30 A.M. Technical Session (Gas Turbines)—
"European Gas-Turbine Developments," by S. A. Tucker
"Recent Brown-Boveri Gas-Turbine Developments," by P. R. Sidler
"Control of Closed-Cycle Gas-Turbine Plants" by F. Salzmann
Technical Session (Marine Drives)—
"The Bowes Drive," by B. C. Seaman
"Heavy-Duty Chain Drives for Marine Propulsion Service," by Norman Bremer

2:00 P.M. Inspection Trips: Optional (To be arranged)

Switch to AUTO-LITE for Diesels

STARTERS



GENERATORS

AUTO-LITE electrical systems for Diesels are the result of Auto-Lite's 35 years of automotive electrical experience. Auto-Lite engineers were among the first to start internal combustion engines electrically. Auto-Lite Diesel systems are complete from generator to voltage control to battery to starter. Engineers and executives are invited to consult with us on Diesel cranking and generating equipment.

THE ELECTRIC AUTO-LITE COMPANY
TOLEDO 1, OHIO
SARNIA, ONTARIO

BATTERIES

TUNE IN THE AUTO-LITE RADIO SHOW STARRING DICK HAYMES—EVERY THURSDAY NIGHT, 9:00 P. M.—E.T. ON CBS

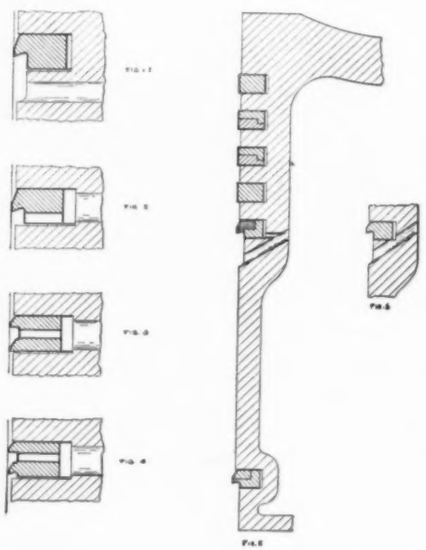
OBSERVATIONS ON OIL CONTROL RINGS

By F. BLACK*

IN four-cycle Diesel and gas engines of the vertical trunk-piston design, the problem of oil control has been explored from every angle. In most cases these studies have been concentrated on ring types as indicated by the great number of ring styles that are now available. Drilling of the piston to carry away the surplus oil removed from the cylinder and the location and number of oil rings, too, have received due thought and now follow pretty much a fixed pattern. While in some cases the oil rings are located above the piston pin, more generally one ring is located in the piston skirt and a second ring above the pin. For purposes of this article the latter application is featured.

By way of introduction, cylinder lubrication is provided by one of two methods: the smaller engines by crank throw and the larger engines by force feed mechanical lubricators. In the former case the oil control rings serve the dual purpose of removing all surplus oil from the cylinder while at the same time allowing to remain an oil film of sufficient thickness to adequately lubricate the compression rings. In the latter case it may be claimed the function of the oil rings is to prevent crank-case oil from working up into the compression ring belt since lubrication of the compression rings is a function of the mechanical lubricator. In either case the oil removed from the cylinder should be quickly disposed of. This is usually accomplished by drilling holes through the piston for returning the oil to the crankcase.

Oil control rings fall in two general classifications designated as single and two-bearing rings. Typical designs of the single bearing ring are shown in Figures 1 and 2 while typical designs of the two-bearing ring are shown in Figures 3 and 4. From these illustrations it will be noted oil rings are of square or rectangular cross section and have grooves turned in the face of the ring to develop a scraping edge or scraping edges as the case may be. Drain slots or notches are provided in the ventilated type of ring through which the oil removed from the cylinder may escape. With the non-ventilated ring, drainage is accomplished by holes drilled through the piston below the oil ring groove. In nearly all cases the upper edge of the bearing surface is chamfered so that the ring will ride over the oil film on the up stroke while the lower edge is made sharp to cut through the oil film on the down or oil removing stroke. The oil scraping effectiveness of the ring depends on a combination of factors such as its unit pressure, the shearing action of its scraping edge and provision for getting rid of the oil. The unit pressure depends on the inherent tension in the ring which in turn may be regulated by increasing or decreasing the bearing area as desired. Still another factor is the ability of the ring to contact the cylinder uniformly all around and with uniform pressure. Since the unit pressure is limited to the inherent tension in the ring, which in turn



is restricted by the necessity of snapping the ring over the piston without deformation, expander springs are sometimes inserted behind the ring if conditions of operation indicate a higher unit pressure is required. Expander springs have many disadvantages; however, these are largely offset by the advantage of insuring positive and equally distributed unit pressure, particularly if the cylinder is slightly out of round from wear or unequal expansion. In the case of large diameter rings this advantage alone frequently warrants the use of expanders.

As a Field Engineer of a ring manufacturer, hundreds of engines come under my observation in the course of a year. By carefully kept performance records of many make engines; records that included the type piston rings used, the unit pressures employed, the application of the rings to the piston and the drilling of the pistons, it would be logical to assume in due course of time formulae could be established to meet all engine requirements within a reasonable degree of error. And while this has been accomplished for the type of engines used in the industry served, the degree of error at times is quite disturbing even though a thorough engineering job has been done with respect to the many variables over which there is control, including the use of various style rings, varying the unit pressure, using expanders and increasing oil drainage.

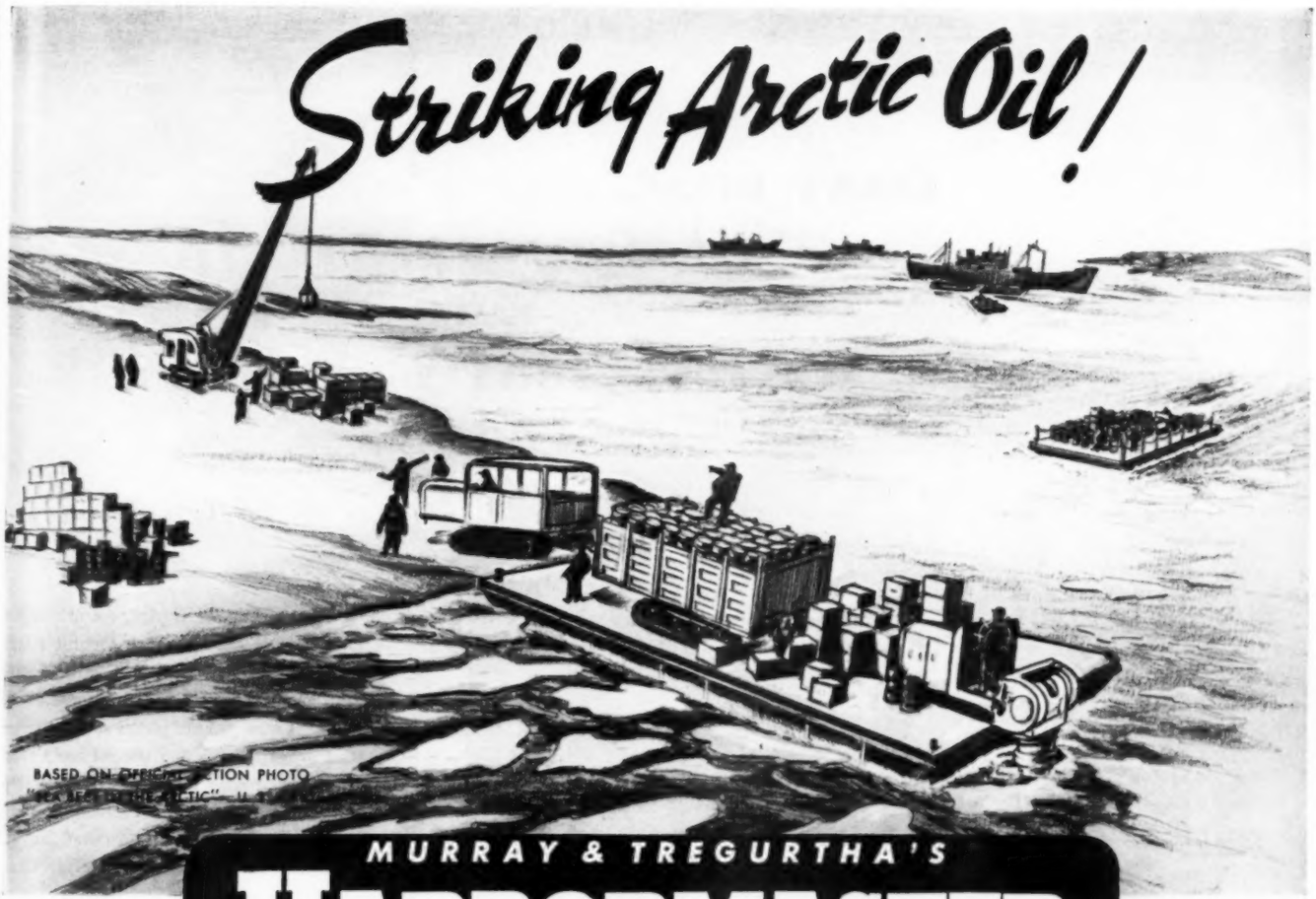
It has been observed in some cases a fixed set of conditions seemed to indicate a two-bearing ring whereas in other applications involving similar conditions a single bearing ring produced the better results. A re-examination of many of these cases indicated that by holding all the variables as nearly constant as possible, certain forces were present that were not reeciving consideration. The variables, other than the rings, that influence lube oil consumption include the design and fit of the piston, leakage around piston pins, pressure of the bearing lube oil system, provision for oil drainage in the piston, to mention only the more important. In examining these variables attention was directed to a condition that appeared quite common in most applications. This consisted of an accumulation of spent oil in the form of carbon, lacquer and sludge in quantities beyond what would be expected if the oil flowered freely through the drain holes, the thought being that free flowing oil would tend to wash the surfaces clean provided, of course, oil in sufficient quantity was present. This observation opened up a new line of study, the results of which have prompted these observations.

In a 300 rpm. engine the piston completes its downward stroke in 1/10 of a second during which time the oil removed from the cylinder must be dissipated through the drain holes that are conventionally drilled in a horizontal plane. Eliminating gravity because of the time element, it was obvious considerable pressure must develop to force the oil through the orifices (drain notches) in the ring and drain holes in the piston. Such a pressure would have a tendency to reduce the unit pressure of the ring and thus promote leakage of the oil past

. . . . *And now please turn to page 76* . . . .

* *Field Engineer, C. Lee Cook Manufacturing Co.*

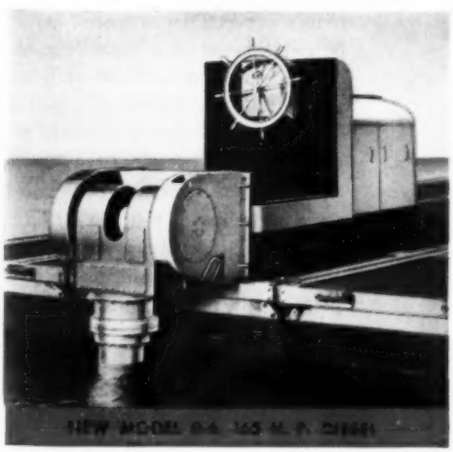
Striking Arctic Oil!



BASED ON OFFICIAL NAVY PHOTO

MURRAY & TREGURTHA'S

HARBORMASTER



Marine operations in the Arctic demand the best! In using compact, heavy-duty "Harbormasters" for exploring and developing the vast new Alaskan petroleum fields, the "Sea Bees" quickly and efficiently transported supplies, heavy machinery and materials from ships at deepwater anchorage directly on to the tundra shore. Whether your operations are in the Arctic, the tropics, on inland, lake or coastal waters, you'll always have the best when you use "Harbormasters" . . . the rugged propulsion Units that deliver the tops in efficiency, power, maneuverability and economy in shallow and deepwater operations. Write today for complete details on all Units ranging from 20 H. P. to 330 H. P., diesel or gasoline—the "Harbormaster" delivers the goods in all waters!

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High Fidelity Marine Engines since 1885

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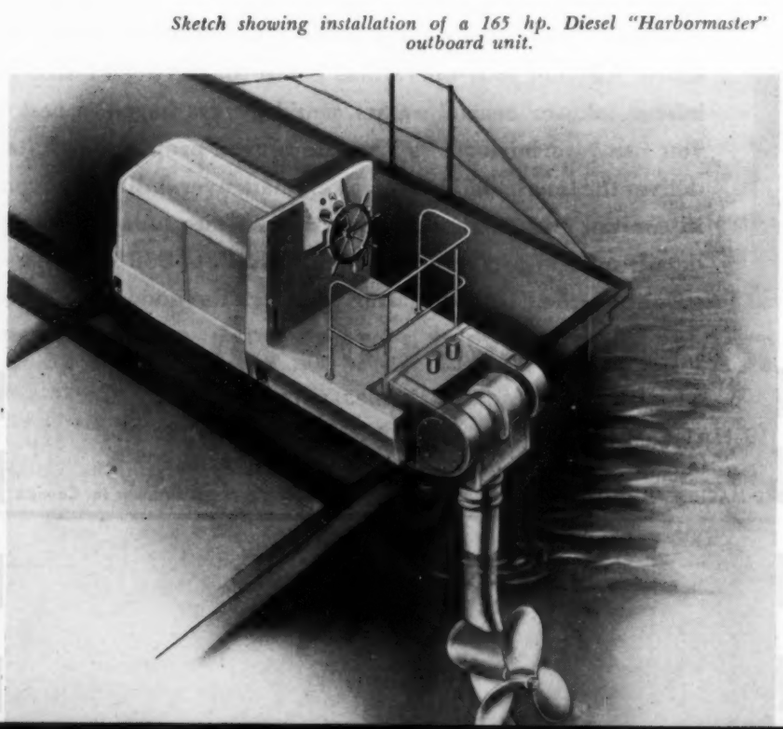
GIANT DIESEL OUTBOARDS IMPROVE MANEUVERABILITY

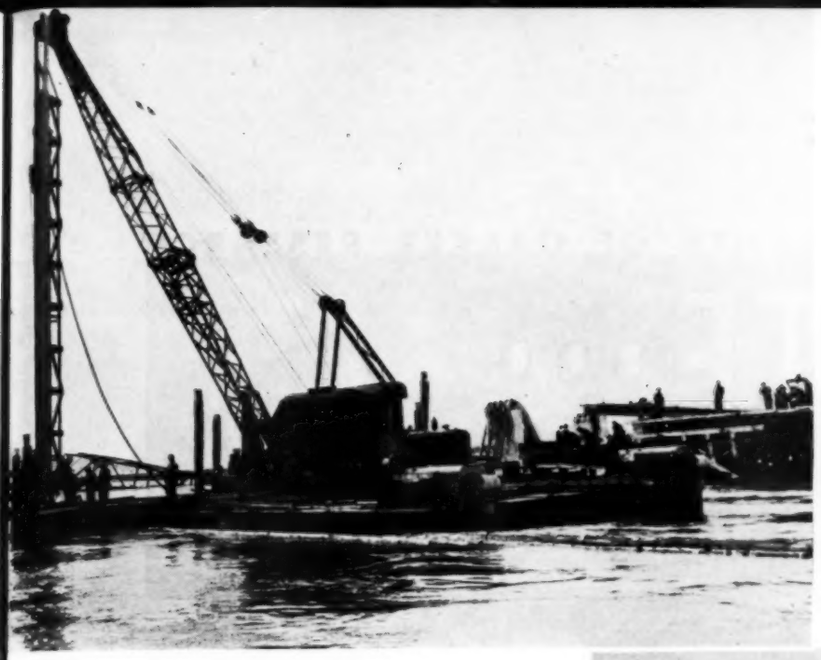
The new Murray & Tregurtha work boat equipped with "Harbormaster" and remote control.

Sketch showing installation of a 165 hp. Diesel "Harbormaster" outboard unit.



NOW that the war is over, one of the Navy's greatest work horses is available for commercial use. It is the portable outboard propulsion unit which was utilized on unnumbered Navy pontoon barges. The power units were installed in many types and sizes of barges. Some of the larger barges utilized as many as 3 propulsion units. They were invaluable for crane, derrick pile driver barge installations where the use of a tug would be otherwise necessary. For salvage and diving operations they were practically a necessity.

There are several interesting features about these units. Once mounted on a barge the propeller acts as the rudder since it is free to turn not only the 90 degrees usually allowed for rudder swing but a full 360 degrees. Furthermore, the propeller is free to move in a vertical axis a full 180 degrees thus permitting the screws and drive shaft to be lifted clear of the water for overhaul. This last mentioned fact also permits operations in very shallow water, since the propeller will lift itself free of any obstruction it might hit and, as soon as the obstruction is passed, will return to its normal position as a result of propeller thrust.



Maneuvering a cumbersome work barge in treacherous current and submerged debris during reconstruction of Antwerp Harbor. Note the two "Harbormaster" units, lower right.

Official U. S. Signal Corps Photo

Pontoon barge powered with a "Harbormaster" at work in the Ryukyus.

Official U. S. Navy Photo

This barge, fitted with "Harbormaster" does odd jobs for the Bowater's Newfoundland Pulp & Paper Mills.

During wartime operations it was noted that these units had a great deal of power, sometimes more than boats with considerably greater horsepower ratings. Only recently the reason was discovered. It was found that installed as they were, these units actually produced thrust horsepower more efficiently than the conventional inboard power plants, which had to overcome the friction of shafts, gears stuffing boxes, and stern tube bearings. Also since these outboard engines were clear of hull water disturbances and were unencumbered by rudder friction they got a better "bite" than the inboard type propeller installations.

The Murray and Tregurtha Co., makers of these sturdy units for the Navy, is continuing to produce them for civilian use. The Harbormaster line of Diesel and gas driven units ranging from 20 to 330 horsepower are suitable for heavy duty in coastal or inland waterway operations. The newest in the Harbormaster line is the new 165 hp. unit driven by a Mack Diesel, which incorporates the power, maneuverability, operating efficiency and maintenance economy of all its forebears.

MODERN DEVELOPMENTS OF GASKET RESEARCH

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A BETTER JOINT SEAL FOR HIGH PRESSURE LINES

All Industry may benefit from the Petroleum Industry's solution to one of the most difficult gasketing problems.

The Ring-Type Joint, providing an all-solid-metal joint assembly, is fast finding favor in high pressure and temperature steam and chemical processing services.

Goetze V-Tite Gaskets, used almost exclusively by the Petroleum Industry for sealing ring-type joints, are the product of years of mechanical, metallurgical and chemical research.

They are available in Armco Ingot Iron or low carbon steel, 4-6 Chrome Alloy Steel, or any of the several other desirable metals or alloys; in sizes ranging from one to 80 inches in diameter and of standard oval or octagonal shape.

Every step in the fabrication of V-Tite Gaskets, from metal analysis to final inspection, is rigidly controlled to guarantee strict adherence to every detail of specifications. Extremely close tolerances are maintained to secure perfect fit.

Brinell hardness of 80-90 for Armco Ingot Iron and below 130 for 4-6 Chrome Alloy Steel, is carefully maintained by heat-treating. This assures proper flow of gasket material without damage to flange surfaces and undue stress on bolting.

Consider this better sealing method for your post-war plant requirements.

For other gasket data, interesting to engineers, write for a series of technical bulletins, based on original gasket research from the Goetze Laboratory. Please use company letterhead and mention position.

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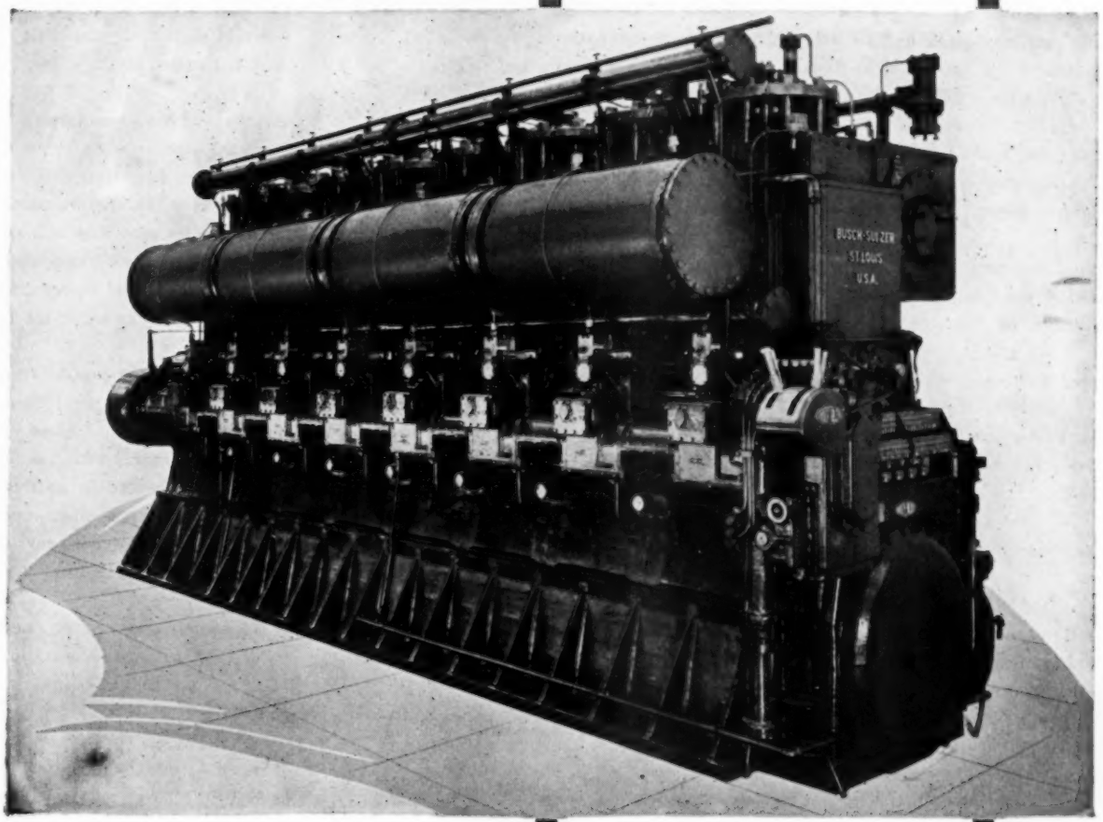
LOWELL THOMAS Speaks on New Gasket Film

Now available to employee groups, technical societies, engineering schools and other organizations throughout the country, this new 35-minute Kodachrome film, "Only a Gasket," tells why these are the "Biggest little things" in modern Industry. Write for full information.

Goetze for GASKETS

"America's Oldest and Largest Industrial Gasket Manufacturer"

Busch-Sulzer heavy duty, two cycle, direct reversing Marine Diesel.



QUALITY
DIESELS

BUSCH-SULZER BROS.-
DIESEL ENGINE CO.

SAINT LOUIS, MO., U. S. A.

SUPERVISING & OPERATING ENGINEERS' SECTION

Conducted by R. L. GREGORY*

"TROUBLE SHOOTING"—Part Three

EXPERIENCES gained in the process of "trouble shooting" are invaluable, because it is from these experiences that you profit as time goes on. And when I speak of experiences, I refer particularly to those encountered when irregularities from the normal functioning of the unit pop up, as they occasionally do in any Diesel or other power plant equipment.

Meeting with, and overcoming these problems forms a foundation upon which to build an increased knowledge of "trouble shooting."

With this in mind and remembering that these discussions refer mainly to the larger types of stationary units, let us just take up a list of the irregularities which one occasionally runs into.

1. Unit will not start when starting air is applied.

Under this heading there are a few minor causes for such an incident the majority of which may be due to oversight on the part of the operator or perhaps due to plain carelessness. They may be enumerated as follows:
(a) Crank not in the proper position for starting.
(b) Barring rig not disengaged.
(c) Insufficient starting air pressure.
(d) Stuck pistons due to long inactivity or improper lubrication.

In the case of the crank being in the wrong position for starting, it is generally a case of oversight. All operators know that the proper position of the crank is approximately from 12 to 20 degrees beyond top dead center.

In starting most of these larger units, it is always advisable before putting the unit in operation to bar it over a few times, with the barring rig and at the same time operate the auxiliary oil pump in order that lubrication is well established. In most large units, this barring rig consists of a motor driven gear ring which engages with a larger gear attached to the rotor of the generator. This barring rig must be disengaged before starting the unit, and if left engaged when the starting air is applied, it acts as a brake on the unit and will not allow it to start.

Have you ever opened the throttle valve, or pulled the starting lever into the starting position and found to your dismay that the unit did not respond, then discovered much to your chagrin, that your starting air pressure was down? This feature should always be checked before trying to start the unit and the operator should be sure that the starting air pressure is well up, as often he has to give it several charges, before the unit will take off, especially in cold weather or where the unit has been idle for some time.

Last but not least is the matter of sticky pistons. Units which have been idle for long periods often run into this trouble. Here again, barring the unit over several times, and applying the lubricant at the same time will eliminate this difficulty.

2. Engine starts when air is applied, but cylinders fail to fire.

(a) Unit is not getting fuel.
(b) Throttle or hand lever is not in running position.
(c) Fuel line stoppage.
(d) Faulty fuel check valves.
(e) Faulty fuel pump.
(f) Compression too low.
(g) Insufficient blast.
(h) Fault in fuel valves.
(i) Tolerance of fuel cams or faulty cams.

There may be several causes for the engine not getting fuel. Fuel may be low in the supply tanks, fuel line stopped up, or the fuel pump may have lost its suction. Then too the fuel valves may not have been opened up. Lack of fuel is evidenced generally in starting, by little or no smoke in the exhaust.

When the unit is started the throttle is thrown in the starting position and as soon as it is turning properly under the applied starting air, this throttle lever is thrown to the running position. If not properly set in the running position so that the cut-off is proper the unit may fail to get fuel.

After a unit has been down for some time there is always a possibility that the fuel line may be stopped up, fuel line check valves stuck or fuel valves sticky. Before starting a unit after being idle for some time it is always practicable to operate the fuel pump and open the fuel checks until the fuel flows freely. This practice also eliminates any air in the lines.

Again there is the possibility of a faulty fuel pump, either worn gears or a leakage which may cause the pump to lose its suction. Many units are equipped with auxiliary fuel pumps, which may be used in starting. This is especially advantageous when operating in cold weather and the fuel is heavy at starting until the fuel tank is heated up.

Compression may be low due to faulty rings, which subject was discussed in a previous article. Or it may be faulty due to lack of scavenging air.

One thing that should always be noted before starting is that of sufficient blast. Normally the blast should be set at around 600 lbs. on units where all heads are of the starting type. Low blast air may result in difficulties if not properly adjusted before starting, and the blast bottle properly charged.

Occasionally the fuel cams become loosened and these should be checked to ascertain whether they are in the proper position. Proper clearances between the fuel cam and the roller should always be maintained. Most cams are tightened to the shaft with set screws and there is a possibility that these set screws can become loose and the cam position shifted. Therefore a check should be made on them periodically.

3. Engine starts, but stops after several revolutions.

(a) Lack of fuel due to some of the above causes.

. . . . *And now please turn to page 78* . . . .

* *Chief Engineer, Municipal Water and Light Plant, Hillsdale, Michigan.*

UNINTERRUPTED

PAYLOAD PRODUCTION WITH SINCLAIR GASCON OIL

Municipal power plant of Coon Rapids, Iowa, reports completely satisfactory operation with Sinclair Gascon D for its 1000-h. p. Fairbanks Morse Diesel.

SUSTAINING uninterrupted payload output with Diesel engines calls for careful attention to lubrication. An incorrect oil leads to engine breakdown, overhaul, unproductive shut-down time, high maintenance cost.

Inherent properties give Sinclair GASCON OILS *natural* ability to disperse carbon formation, to discourage crankcase accumulations and ring sticking.

Efficient, high output operation is a proven fact with Sinclair GASCON. Let us advise you how to save money by sustaining uninterrupted payload production with GASCON.

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Exchange Your Diesel Maintenance Ideas

Conducted by R. L. GREGORY

Editor's Note: In this department we provide a meeting place where Diesel and Gas engine operators may exchange mutually helpful maintenance experiences to keep our engines in top condition. Mr. Gregory edits your material and adds constructive suggestions from his own wide experience. This is your department—mail your contributions direct to DIESEL PROGRESS.

"Liners and Pistons"

THE following situation was recently presented to this department by one of our readers for our advice: "We are compelled to renew the liners in one of our units, and the question has been brought up as to the advisability of also installing new pistons at this time. Some of the plant personnel feel that we should do so, while others feel that the present pistons can be satisfactorily cleaned up and reinstalled and that we can get several more years of service from them, and that the cost of new pistons is not warranted at this time. The main bone of contention being as to the net overall efficiency we can obtain in either situation."

Not being familiar with the present operating condition of the unit in question, nor of the condition of the pistons now in service, the only way that this department can logically answer this question is by telling this reader, the usual procedure in such a case. Whenever one is presented with a major maintenance job of this type, we realize that it runs into money. Liners and pistons are about the most expensive part of a unit to renew, and wherever longevity of these parts can be extended without loss of efficiency, it is profitable to do so.

The necessity of changing liners is caused by two things, either by operational wear, or as we might term it "old age," or from premature wearing out due to failure of lubrication, mechanical defects, overheating, etc., which causes them either to crack or score. Since the above unit has been in service for several years the writer assumes that the necessity for changing liners is due to operational wear or old age.

In such a case, it does not necessarily follow that because of excessive wear of the liner requiring renewal, that it is necessary also to renew the pistons. In the operation of a Diesel unit, certain tolerances are left by the manufacturer, between the outside diameter of the piston skirt and the inside diameter of the liner wall. In other words a clearance must be provided here to allow for proper lubrication and to allow for expansion when the unit is functioning under operating load. These tolerances are ample under any normal operating condition and there is never direct metal to metal contact between these two parts under normal engine operation.

Blowby is controlled by the piston rings, they being of the proper tension when in operation to hug the liner walls and still maintain a lubricant film between the ring and the liner wall. Therefore if a piston has operated normally during operating periods, the rings will wear and the liner wear from operational causes, but the piston skirt should not need renewal with every change of liners.

On the other hand if one runs into cooling troubles or lubrication or mechanical failure, causing a piston to score or sieze, there is a possibility that a new piston must be required with a new liner. However that does not always follow either. There are cases where failure of lubrication or cooling system have caused overheating and the piston and liner have become scored, requiring liner renewal but where the piston has been returned to the manufacturer or taken to some shop where it can be properly handled and a few thousandths removed from the diameter of the piston skirt and then replaced in the new liner, and has functioned for years afterward. The use of such a piston after an accident of this type is entirely dependent upon the depth and nature of the scoring of the piston.

Now many manufacturers design their pistons in two parts, the skirt and the piston head. It sometimes becomes necessary to renew the piston head on a skirt, when fire checking of the head occurs to such a degree that the head becomes dangerous to use in that condition. This however does not affect the piston skirt. Some manufacturers even construct their piston skirts with inlaid metal bands which act as a guide to the skirt in the up and down travel or stroke and the skirt has several thousandths excess clearance from the liner wall.

Efficiency means a minimum of blowby, and since the rings are mainly the determining factor governing this, it is essential that the pistons are equipped with the proper rings. The manufacturer of the unit generally specifies the type and style of ring and the proper end clearance and location of these rings. It is bad practice to take a new liner and place a piston in it which is fitted up with used rings.

The writer knows of several plants, where those in charge have had to renew their rings much oftener than they did in the prewar era, due to the fact that the materials from which they were constructed wore a great deal faster than the prewar rings. This is understandable. Then again engineers have been forced to do things which in normal times they would consider foolhardy, just in order to keep units in operation. For instance one engineer was forced to eliminate the top ring in a unit, the pistons of which normally carried six rings, because he had to keep his units in operation and couldn't get enough rings to fill all grooves at the time he overhauled. This of course is not good practice and if a piston is provided for the use of six rings, six rings should be installed, not five or four.

So normally I would say, that in installing new liners, care should be taken to clean up and inspect the old pistons. If they are in pretty fair condition, with good surface, re-ring them properly and use the old pistons, rather than discarding them. After all much of the efficiency is determined by the sealing properly of the rings, and maintenance costs can be curtailed by using these pistons rather than discarding them.

"A Suggestion on Lighting"

ONE of the greatest drawbacks in many Diesel plants is the proper lighting of instrument panels and switchboard instruments. Now that electrical equipment is becoming a little more plentiful and easier to obtain, some of these conditions can be corrected.

Having used one of the Diesel gauge boards equipped with fluorescent units for illuminating same, it is my contention that this offers the best solution for correcting inadequate lighting at this point. A unit of this type installed above the gauge board instruments and equipped with a good type of reflector, provides a more natural and softer light and does away with the glare. In many plants. . . . *And now please turn to page 78* . . .

Standing Watch BELOW DECKS!

Marquette
HYDRAULIC GOVERNORS AND OVER-SPEED TRIPS

Many of the newest post-war tugs, towboats and other Diesel powered craft are being equipped with Marquette Hydraulic Governors and Over-Speed Trips to regulate and protect their vital machinery.

War service with the Navy proved the dependability of these precision-built governors. That's why in peace-time more and more Diesel engine manufacturers specify Marquette Governors as standard equipment. They insure efficient, trouble-free regulation "below decks".

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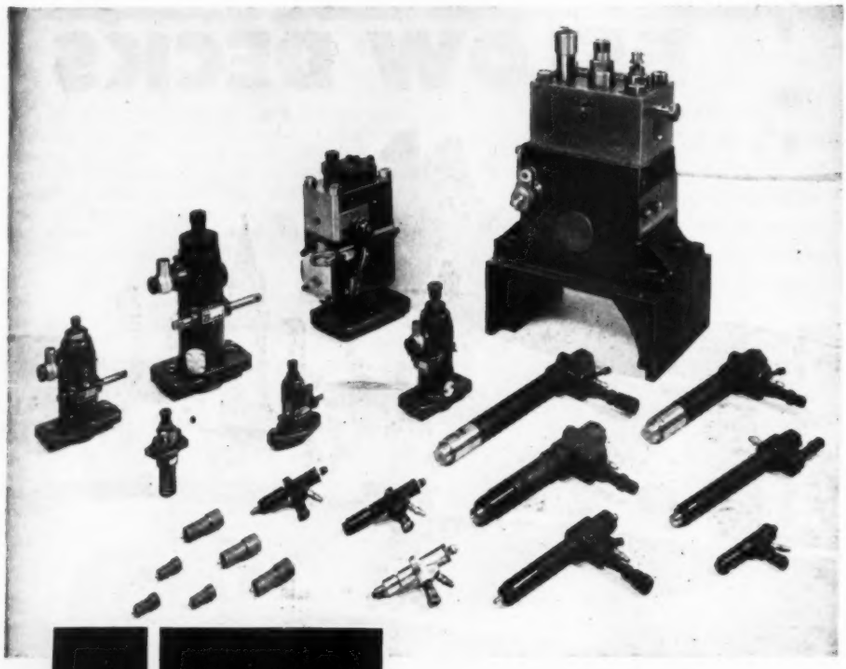

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Whether you need standard fuel injection equipment or special units built to your specifications, Adeco offers the logical source of supply.

Today's line of Adeco equipment, the outgrowth of long experience in serving the Diesel industry, includes: Standard fuel injection pumps in plunger diameters from 7 mm. to 31 mm.; a complete line of standard nozzles and nozzle holders, including the water-cooled type; and the Adeco nozzle tester.

All Adeco products are built to highest standards, with years of trouble-free operation behind them to testify to their reliability.

ADECO NOZZLE TESTER

For Low-Cost Maintenance

America's most widely used nozzle tester enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Compact, portable, sturdy, precision-built. Pressures up to 10,000 p.s.i. Tests both large and small injectors on bench or engine. Prevents costly delays and possible damage to engine. Standard or Navy-approved gauge. Ideal for testing hydraulic equipment. Write for bulletin.

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Woodward Governor Resumes Prime Mover Control Conference

AFTER a seven-year lapse the Prime Mover Control Conference, sponsored by Woodward Governor Company and the various branches of the water power industries and first held in 1927, will again be held June 11-15 this year in the company's new plant. A comprehensive program has been prepared, including discussions of governor fundamentals, Diesel and other internal combustion engine governors, servicing and maintenance of governors, and other allied subjects. Woodward invites all interested in this field to attend, the cost being only transportation and personal living expense. If you plan to attend, wire Woodward Governor Company, Rockford, Illinois for reservation.

Fairbanks-Morse Announces Changes In Railroad Division

R. H. MORSE, JR., Vice President and General Sales Manager of Fairbanks, Morse & Co., recently announced the appointment of V. H. Peterson as Manager of the Railroad Division of the company.

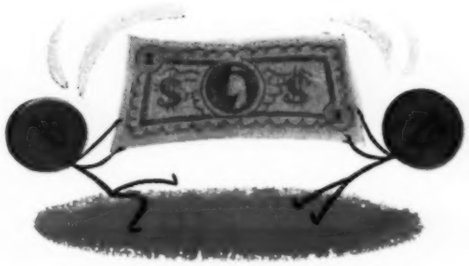
Mr. Peterson has had long and varied experience in the railroad field having been formerly Assistant to the President and Manager of the New York office of the Baldwin Locomotive Works, which position he held until only a month ago when he joined the Fairbanks-Morse organization as assistant to John W. Barriger, III, who resigned on May 1st to become President of the Monon Railroad.

In accepting the resignation of Mr. Barriger, Mr. Morse said that he did so with great reluctance as Mr. Barriger had been most helpful in promoting the sale of the company's new line of Diesel Locomotives. "What is our loss is the Monon's gain," said Mr. Morse. "We know that John will do a great job for the Monon and we wish him the best in his new undertaking. We welcome Mr. Peterson to the management of our Railroad Division as he is well-known in the field and has had unusual experience. Sales of our new lines of Diesel locomotives are continuing nicely."

Descaling Engine Blocks

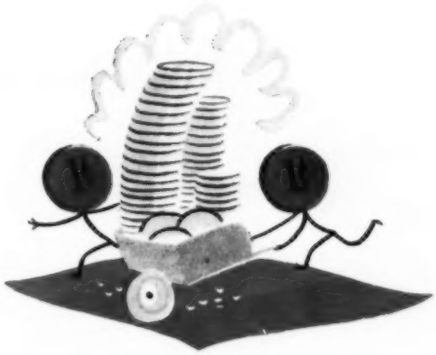
A RECENT issue of Oakite News Service carries an interesting and informative article on descaling engine blocks. The article describes and illustrates, in detail, the procedure and equipment required for rapid, effective engine block cleaning and should prove helpful to all concerned with this problem. Write Oakite Products, Inc., 22 Thames St., New York 6, New York, for a copy of Oakite News Service, Volume 30, Numbers 3 and 4.

***Out of every dollar** of operating expense ... you spend only 2¢ for motor oil.*



***With Macmillan,** those two cents spread a tough, heat-absorbing, pressure-absorbing film throughout the motor.**

***They remove hard carbon** ... then keep the motor cleaner.*



***They're money-makers.** They reduce the cost of down-time, repairs and maintenance.**

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Macmillan Ring-Free motor oil IS different. Because it IS a better oil, we invite you to test it against any other brand. We'll gladly help you arrange a dollars-and-cents test in your own equipment. Write, wire or phone the nearest Macmillan office. MACMILLAN PETROLEUM CORPORATION. 50 W. 50th St., New York 20 • 624 S. Michigan Avenue, Chicago 5 530 W. Sixth St., Los Angeles 14.

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THE LOW-MAINTENANCE OIL

HIGH, HIGH FILM STRENGTH! LOW, LOW ENGINE DEPOSITS! CLEANS AS IT LUBRICATES!

Here it is

Oil Control Rings.

cont'd from page 62

the rings. As an experiment the pistons of several engines were drilled with the holes slanting in an upward direction or in the reverse direction of what might appear on the surface to be correct if gravity were depended upon to drain off the oil. This drilling was based on the theory that the velocity of the piston on its downward stroke would bring into play the law of inertia with respect to the oil, thus forcibly ejecting the oil upward through the drain holes.

Working with engines that had seen considerable use, the pistons of which were conventionally drilled, created many problems yet sufficient improvement in lube oil consumption was obtained to warrant the time and expense of carrying on the experiment further and under more favorable circumstances. These further experiments indicated very definitely that with upward drilling of the drain holes the problem of lube oil control was greatly simplified. In particular lower unit pressure rings could be used thus providing more ample bearing surfaces which in turn would manifest itself in longer ring life and therefore make it possible to hold lube oil consumption at a low rate over a greater period of time.

In the final tests piston drilling and type of ring used are indicated in Figure 5. Here we have a single bearing ring (Figure 1) of the seal joint type without drain notches. By sealing the gap at the upper land and across the scraping face of the ring, for all practical purposes a gapless ring is obtained and a reduction in lube oil consumption is effected. It will be noted that the oil drain holes are located below the groove and drilled to slant upward. Bleeder holes are drilled from the back of the ring into the drain holes to syphon off the oil that works behind the ring through the clearance of the ring in its groove. In some cases it has been found expedient to drill the drain holes so as to break through the lower inner corner of the groove, thus eliminating the necessity of dual drilling (Figure 6).

This improvement in the drilling of the oil drain holes, while still in the experimental stage, has shown sufficient promise for it to be passed on to the trade through the means of this article. No reference has been made to the oil ring in the skirt since this ring may be considered an auxiliary ring to remove bulk oil from the cylinder resulting from crank throw, and can take any one of many forms as to the ring itself and its application to the piston. In Figure 5 the skirt ring is of duplicate design to the ring above the pin, drainage being provided by reduced diameter of the piston below the skirt groove.

Lube oil consumption is usually measured in horsepower hours per gallon of oil consumed. Authorities do not agree as to the exact requirements for various type and size engines and little if any literature is available to guide the operators other than that supplied by the builder of the equipment. The problem as I find it has been one of providing a ring application that maintains a satisfactory rate of lube oil consumption for a greater period of time and particularly as the engine ages with use. The tests and observations reported herein deal with engines in which lube oil consumption urgently needed correction; however, it is believed the principles introduced apply to new as well as old engines.

If you're operating or manufacturing smaller horsepower Diesels, you should be "current" on the Ross Type "BCF" Lube Oil and Jacket Water Cooler.

You should know how Ross builds high heat transfer efficiency and sturdiness into so small, compact and light-weight a unit . . . and how, through the Ross system of individually assembling each cooler from standard parts, your needs and operating conditions are accurately met.

To assure best possible performance, have a Ross Heat Exchange Engineer analyze your requirements. He'll make practical recommendations.

Ross Equipment is manufactured and sold in Canada by Horton Steel Works Ltd., Fort Erie, Ontario

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Bailey Graduates get the jobs at MARINE TRANSIT COMPANY

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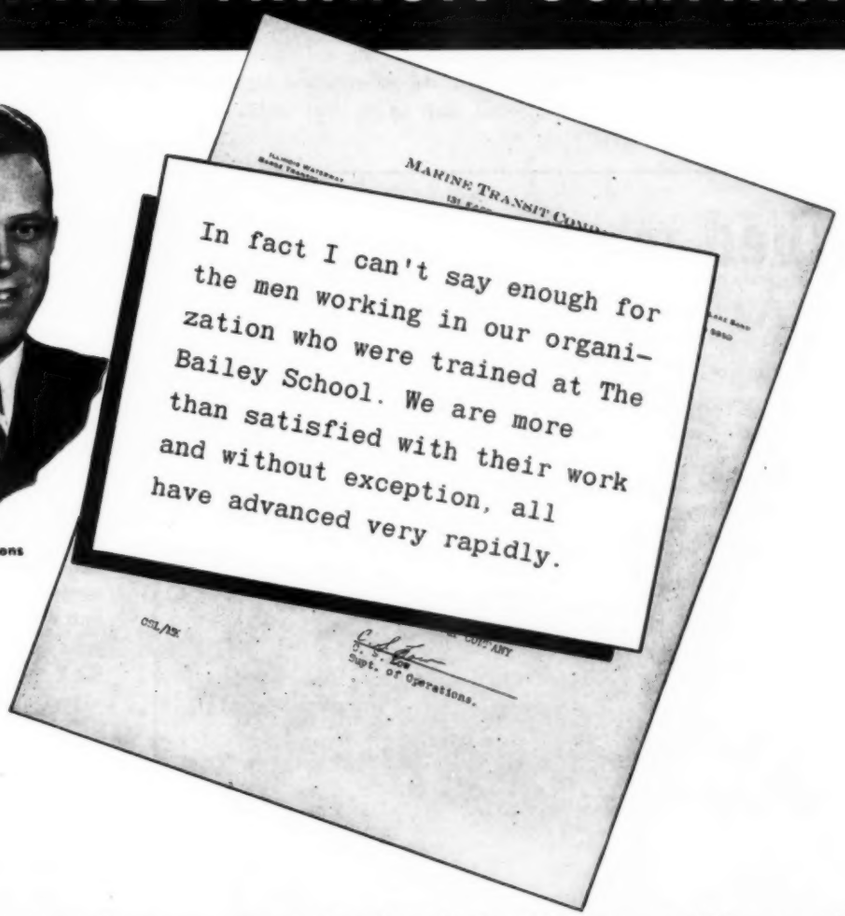
Supt. of Operations


MARINE TRANSIT
In fact I can't say enough for the men working in our organi-
zation who were trained at The
Bailey School. We are more
than satisfied with their work
and without exception, all
have advanced very rapidly.
Supt. of Operations.

Let us send you men trained to "grow with you"

The Marine Transit Company of Chicago and many other users of Diesel power are learning that one of the best recruiting grounds is the graduating class of The Bailey Schools.

The thorough training given by the theory plus shop practice method prepares Bailey men to be self-reliant at once and to grow rapidly into positions of responsibility. They know the construction, maintenance, and use of Diesels—both the scientific theory side, and the practical side. To help them learn, they are given the advantages of one of the best equipped shops and laboratories in the country, and are guided in their study by an experienced teaching staff. Several of these instructors have been with Bailey since its founding, 10 years ago. The accomplishments of the men trained this way have built a national reputation for The Bailey Schools.

When you need a young Diesel man, let us recommend a "comer" to you. In all probability he will be a veteran of World War II, trained by us under the G.I. Bill of Rights.

THE BAILEY DIESEL SCHOOLS

1651 S. GRAND AVE. • ST. LOUIS 4, MO.

Modern Training by Shop Practice

DIESEL . . . RADIO . . . ELECTRICITY . . . REFRIGERATION . . . and AIR CONDITIONING

Trouble Shooting, *cont'd from page 68*

(b) Air pocket in fuel lines or in the pump, the fuel thus becoming air bound.

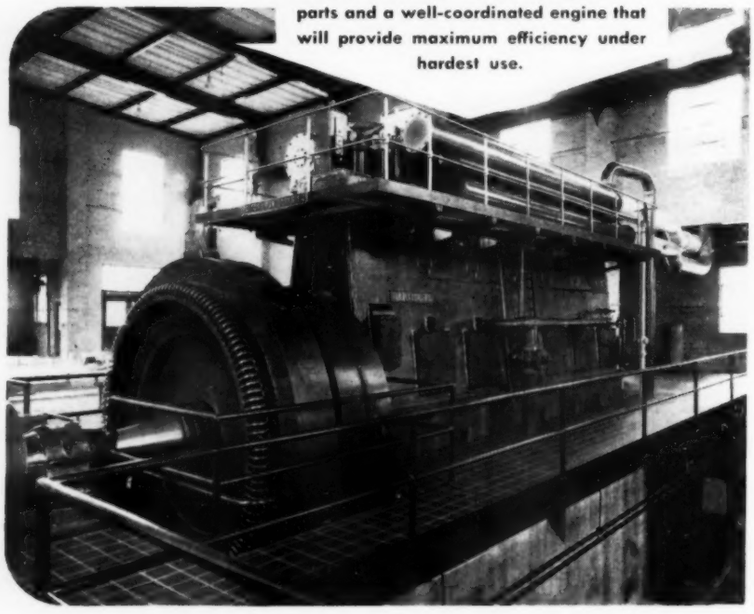
When there is evidence of the fuel lines being air bound, check all fuel lines, that is the supply line to each cylinder. This is accomplished by opening the needle valve in the fuel check valve, barring the engine to a position where th fuel pump roller is on the circular part of the cam for that particular cylinder. Then operate the pump plunger until the fuel line is completely filled to the needle valve and the fuel flows freely from the check valve with no evidence of air bubbles. When this occurs close the needle valve on the check valve and repeat this performance on all cylinders until you are assured that all lines are free from air.

4. Engine overspeeds after starting up.

This situation is generally caused by improper functioning of the governor and fuel mechanism. When such an incident occurs be sure to check this mechanism to see that it is properly set and free from sticking. Governor should be inspected frequently, thoroughly lubricated and checked as to freedom of operation in all functioning parts.

Finished TO CLOSE LIMITS

Because the Fulton plant is amply equipped to apply jigs and fixtures to every possible machining operation... the heaviest parts of even a mammoth 2400 h. p. Fulton Diesel are finished to closest limits. This ensures uniformity of parts and a well-coordinated engine that will provide maximum efficiency under hardest use.



1500 h.p. 6 cylinder 4 cycle Fulton Diesel at Algona, Iowa Electric Light and Power Plant.

94 YEARS OF MACHINE DESIGN

FULTON DIESELS

FULTON IRON WORKS CO.
SAINT LOUIS, MISSOURI

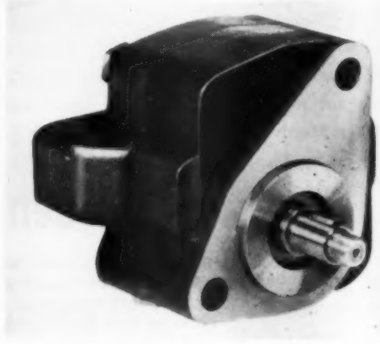
Liners and Pistons, *cont'd from page 72*

they depend upon the high ceiling lights for this illumination and it leaves much to be desired.

Another place where fluorescent lights prove most efficient is over the switchboard and switchboard instruments, as they make these instruments more easily read from a distance. These units are inexpensive and economical in operation and usually can be installed right in the engine service lines or connected directly off the switchboard wiring. Some manufacturers are now using this type of light for gauge and instrument board lighting, and installing the same as standard equipment. It certainly is an improvement over the old type of light.

New Aro Gear-Type Hydraulic Pump

A NEW gear-type hydraulic pump is announced by The Aro Equipment Corp. The unit delivers pressure up to 2000 psi. with 5½ gpm. @ 2800 rpm. Volumetric efficiency using S.A.E. No. 10 oil is above 90%. Overall efficiency above 500 psi. is 85% or better. The pump is suitable for hydraulic systems ranging from 100 to 2000 psi., such as farm tractor equipment actuation and control, hydraulic presses, machine tool feed controls, hydraulic jacks, bulldozer blade control, road machinery control, and other uses. The unit is approximately a 3½ in. cube, with ½ in. dia. x 11/16 in. drive shaft extension, plus threaded portion for ⅜ in. nut. Design and selection of materials permits easy and economical conversion to "new pump" performance in event of wear. For full particulars write The Aro Equipment Corp., Bryan, Ohio.



Diesel Engine DANGER points

Filter deposits formed in 204 hours with best uncompounded mineral oil.

Clogged Oil Filters Cause Frequent Shutdowns

One cause of frequent costly and time-wasting Diesel shutdowns is filter clogging. The condition can become dangerous since a clogged filter may stop circulation of oil to the engine if the warning of a drop in oil pressure is not heeded. Analysis of filter deposits prove them to be composed of products resulting from incomplete burning of the fuel and oxidation of oil plus iron, silica and water.

Filter Deposit formed in 1230 hours with RPM DELO Oil.

RPM DELO Oil Reduces Filter Clogging Two Ways

As the two filters illustrated show, RPM DELO Diesel Engine Lubricating Oil greatly lengthens the time between shutdowns for filter servicing. This is accomplished in two ways:

1. A detergent in RPM DELO Oil prevents the stuck piston rings which, through blow-by, permit dust, unburned fuel and carbon to mix with oil.

2. Another compound in RPM DELO Oil fortifies it against oxidation.

Other additives in RPM DELO Oil protect Diesel Engines against corrosion, excessive wear on upper cylinder walls, and foaming.

DIESEL ENGINE RPM DELO LUBRICATING OIL

To match the fine performance of RPM DELO OIL, use these equally efficient companion products from the same famous "RPM" line – RPM HEAVY DUTY MOTOR OIL – RPM COMPOUNDED MOTOR OIL – RPM GEAR OILS AND LUBRICANTS – RPM GREASES. For additional information or name of your distributor, write any of the companies below:

STANDARD OF CALIFORNIA · 225 Bush St., San Francisco 20, California
THE CALIFORNIA COMPANY · 17th and Stout Streets, Denver 1, Colorado
STANDARD OIL COMPANY OF TEXAS · El Paso, Texas
THE CALIFORNIA OIL COMPANY · 30 Rockefeller Plaza, New York 20

D.E.M.A. Publishes Revised "Standard Practices"

BECAUSE of progressive developments in the Diesel engine manufacturing industry during the last decade, it has become necessary to revise the book, "Standard Practices," printed in 1935 by the Diesel Engine Manufacturers Association. The new book is the product of member companies of the Association, which coordinated their engineering and sales departments and delegated representatives to rewrite the former treatise. In a series of five meetings the content of the former "Standard Practices" was completely rewritten by the following committee:

V. O. Harkness, manager general Diesel sales, Fairbanks, Morse & Co., chairman; J. C. Barnaby, assistant director research and development, Worthington Pump and Machinery Corporation; Charles E. Beck, sales manager, Busch-Sulzer Bros.-Diesel Engine Co.; Volney M. Holmes, assistant manager engine sales division, Worthington Pump and Machinery Corporation; J. W. Linford, sales manager Diesel division, American Locomotive Co.; L. L. Peterson, assistant sales manager heavy machinery division, Nordberg Manufacturing Co.; T. O. Kuivenen, engineer, Cooper-Bessemer Corporation; T. M. Robie, assistant sales manager, Diesel division, Fairbanks, Morse & Co.; Paul Shirley, consulting engineer, General Machinery Corporation, and R. C. Straube, district manager, National Supply Co.

Chapter headings of the new book, titled "Standard Practices for Stationary Diesel Engines," give an idea of its scope: "Definitions," "Standard Performances and Equipment," "Diesel Engine Construction," "Governors and Speed Regulation," "Torsional Vibrations and Critical Speeds," "Intake and Exhaust Systems," "Cooling Water Systems," "Lubricating Oil Systems," "Fuel Oil Storage and Handling," "Generators and Electrical Equipment," "Selection of Engine Sizes," "Diesel Power Plant Buildings," "Erection of Diesel Engines," "Lubricating Oil Characteristics," "Fuel Oil Characteristics," "Field Test Code" and "Suggestions for Bids and Specifications."

The book, soon to be off the press, is written primarily for consulting engineers, buyers and users of Diesel engines, and manufacturers of engines, and of engine parts and accessories. Also it is anticipated that a number of colleges and universities which teach mechanical engineering will use the new work as a reference. Illustrated by 25 drawings and charts, the book is priced at $2.50. Order from Diesel Engine Manufacturers Association, 1 North La Salle Street, Chicago 1, Illinois.

SAE's Summer Meeting Program Contemplates Broad Survey of Automotive Engineering Needs

REALISTIC survey of engineering requirements for future development of automotive transportation and industrial applications of war-developed techniques will feature the program of the Summer Meeting to be held by the Society of Automotive Engineers at French Lick Springs Hotel, French Lick, Ind., June 2 to 7.

SAE General Manager John A. C. Warner, announcing the tentative program of the first SAE Summer Meeting to be held since before the war, explained that 20 morning, afternoon, and evening sessions are scheduled and that the "Golden Jubilee" of the automobile additionally will be observed.

"Plans for the Summer Meeting," said Mr.

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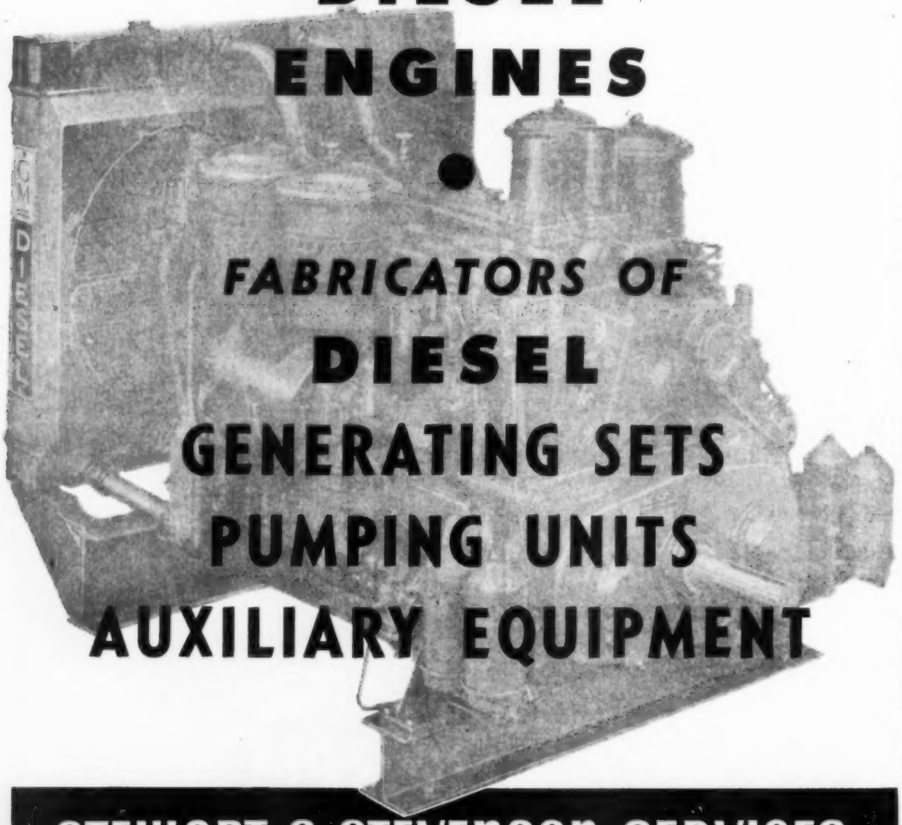

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Branches in Principal Texas Cities
COMPLETE PARTS 24-HOUR-A-DAY SERVICE

Warner, "contemplate bringing to French Lick some of the oldest American motor vehicles and some of the newest military developments in rocket and jet propulsion. The seeming incongruity emphasizes the progress and the broadened thinking which characterize automotive engineering, now applied alike and internationally to vehicles of land and air, whatever their power plants."

The meeting opens with a banquet at which Dr. Stephen J. Zand, of Sperry Gyroscope Co., Lake Success, L. I., N. Y., will present an illustrated lecture on "Strategic Bombing of Germany." One entire session will be devoted to operators' ideas of motor truck design, another to the potential and realized economics of air transportation, and a third to a symposium on gear lubricants. Detailed reports by members of technical intelligence committees which investigated the German automotive industry will occupy an entire evening.

Other subjects to be discussed at scheduled technical sessions include European economy cars, motor bus design, fuels and lubricants requirements, jet engines, new materials, fleet maintenance, bearings progress, and driver training. Sessions will be sponsored by SAE Transportation & Maintenance, Passenger Car, Truck & Bus, Aircraft Powerplant, Materials, Diesel Engine, Air Transport, and Fuels & Lubricants Engineering Activities.

Commander Stevens Returns to National Supply

Lt. Cmdr. George W. Stevens

LIEUTENANT Commander George W. Stevens has returned to the Superior Engine Division of the National Supply Company after 3½ years with the Navy. He will be located at Fort Worth, Texas and has been appointed Regional Manager, the same position he held prior to entering the service.

Accurate-
OVER THE ENTIRE SCALE
150
200
WESTON
100
250
50 °F 300
Weston All Metal thermometers
Engineered and constructed with typical WESTON precision, these rugged thermometers are dependably accurate over the entire scale. Moreover in their unique all metal construction, the bi-metal principle has been developed to assure the retention of this high accuracy over long periods of time . . . despite shock or vibration, or subjection to temporary over temperatures.
Equally important . . . you can read a WESTON accurately and easily, even in subnormal light, in out-of-the-way corners, or on equipment or pipelines above or below eye level.
WESTON gauge-type, all-metal thermometers are available in types, sizes and stem lengths for equipment mounting, as well as for industrial and processing needs. Full details, in bulletin form, available on request . . . Weston Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey.
Weston All Metal THERMOMETERS

To help increase "Take-Home Savings"

THE Treasury Department has published two new booklets to help you and your employees realize the utmost benefit from your Payroll Savings Plan—benefits proportioned to the extent your employees add to "take home savings" by buying and holding U. S. Savings Bonds.

"Peacetime Payroll Savings Plan" for key executives offers helpful suggestions on the conduct of the Payroll Savings Plan. In addition, it quotes leaders of Industry and Labor and their reasons for supporting the Plan.

"This Time It's For You" is for distribution to employees. It explains graphically how this convenient, easy thrift habit works. It suggest goals to save for and how much to set aside regularly in order to attain their objectives. If you have not received these two booklets, or desire additional quantities, communicate with your State Director of the Treasury Department's Savings Bond Division.

See your Payroll Savings Plan through to maintain your share in America's future. It is sound economics and a powerful force for good today—and tomorrow—as a safeguard for stability and a reserve of future purchasing power—money that is kept within your community.

The Treasury Department acknowledges with appreciation the publication of this message by

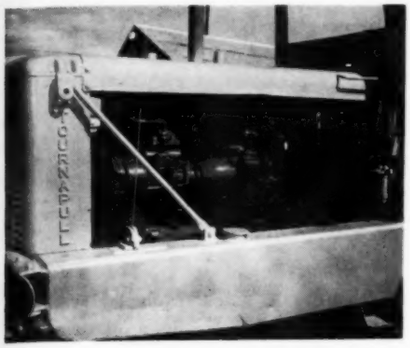
R. F. Gaddis

Editor—DIESEL PROGRESS

This is an official U. S. Treasury advertisement prepared under the auspices of the Treasury Department and Advertising Council

Full-Flow Oil Conditioner

A NEW oil conditioner, originally designed to provide full-flow filtration for Cummins Diesel engines, but equally suitable for use on any heavy-duty gasoline or Diesel engine with similar requirements, has been announced by Winslow Engineering Company.



A Cummins Diesel-engined "Tournapull" equipped with the new Winslow Oil Conditioner.

Intended for engines of from 150 to 250 horsepower, the new conditioner is known as Model No. 8-931-C. Containing eight Winslow elements with a total filtering area of 684 square inches, it weighs 35 pounds dry and 65 pounds wet and has an oil capacity of 3¾ gallons. The elements, when they are clean, permit a maximum efficient flow of 15 gallons per minute with the oil at 140° F. minimum. The conditioner is so designed, according to its manufacturers, that the oil cannot drain back into the crank-case when the engine is idle. This means that the filter will be full whenever the engine is started, thereby eliminating any chance of a flooded crank-case.

First test report on the new conditioner, taken on what was said to be an exceptionally tough construction job, revealed a noteworthy performance of 147 hours of life for the initial set of elements, with continuously clean oil. For full particulars write Winslow Engineering Company.

1945 Diesel Progress Editorial Index Available

A COMPLETE Editorial Index of all issues of DIESEL PROGRESS published in 1945, including an Authors Index as well, has been made up in a 10-page, 8½ in. x 11 in. folder and is now available for distribution. A copy of the Index will be mailed, without charge, to all individuals requesting it on their letterhead. Address your request for the 1945 DIESEL PROGRESS Editorial Index to DIESEL PROGRESS, 2 West 45th Street, New York 19.

ALNOR FAX PYROMETER
used on Clark Type DG Diesel engine

Guide to reliable service... *Alnor* EXHAUST PYROMETERS

This Clark 400 hp two-cycle Diesel is designed for generator drive, pipe line service, and general industrial uses where continuous reliable performance is of the greatest importance. As you will find in so many Diesel engine applications, the Alnor Exhaust Pyrometer provides an easily used guide to reliable service. Routine logging of exhaust temperatures serves as a check on uniform loading, efficient operation, and correct adjustment. There is an Alnor Pyrometer to meet the needs of any engine installation, large or small, afloat or ashore. Write for bulletin with complete data.

ILLINOIS TESTING LABORATORIES, INC.
420 NORTH LA SALLE STREET • CHICAGO 10, ILLINOIS

DIESEL LOCOMOTIVE PAYS FOR ITSELF

SIX months operation has proved the value of Diesels to the management of the Florence Pipe Foundry and Machine Company of New Jersey.

A Diesel electric locomotive was purchased to replace steam switch engine in July 1945. Since that time it has operated so efficiently and inexpensively that the company has stated that the savings involved may defray 20% of the original purchase price by the end of one year's operation. The fifty-ton 300 hp. locomotive is driven by two Cummins Diesel engines with General Electric generators and motors. The most tangible and easily recognized savings have been in fuel costs, fueling time and maintenance. Fuel costs dropped from $160 a month for coal to $23.71 for fuel oil, and fueling costs, based on a dollar hourly wage rate, dropped from $6.50 a week to one dollar. In maintenance costs the Diesel ran for six months at an expense of $13. and the steam engine for a comparable period required $112. Compiling these and other savings a total figure of $4,825.28 is arrived at as estimated savings for one year, which is approximately 20% of the cost price of the unit.

The added power and the smooth tractive effort of the Diesel enables it to pull 12 cars each of 35 to 40 tons up a two per cent grade, where in former days the steam engine had much difficulty.

FOR DIESEL POWER...

PIERCE GOVERNORS MEAN

★ ACCURATE REGULATION ★ UNFAILING PROTECTION
★ TROUBLE-FREE SERVICE ★ DEPENDABLE LONG LIFE

WHEREVER diesel engines are used—for earth-moving equipment, electric power generation, bus and truck transportation, pumping, hoisting, marine propulsion and the like—Pierce Precision Fly-ball Governors are proving that *good* governing pays dividends in efficiency, economy and satisfaction.

Pierce Diesel Governors are available in either of two types—driving directly from the fuel injection pump—or independently of the fuel pump shaft. They are unsurpassed for accuracy. They serve for years without trouble or readjustment—often longer than the engines themselves.

For these reasons, Pierce Governors are standard equipment on many of the world's finest diesel engines—and preferred replacement equipment on thousands more. Wherever *good* governing is necessary, Pierce governing is indicated.

PIERCE GOVERNORS

THE PIERCE GOVERNOR CO., INC. 1603 OHIO AVENUE ANDERSON, INDIANA

Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes

Electro-Motive Reorganizes Eastern Region

REORGANIZATION of the Eastern Region of Electro-Motive Division of General Motors, with headquarters at 230 Park Avenue, New York City, is announced by N. C. Dezendorf, Director of Sales and Service.

Paul R. Turner takes over direction of the Service and Parts activities of the region, which formerly reported directly to the home office in LaGrange. Mr. Turner continues his responsibilities as Regional Sales Manager. O. L. Olsen continues as Eastern Regional Service Manager, reporting to Mr. Turner. Mr. Elmo Williams is Regional Parts and Stores Representative, reporting to Mr. Turner.

"The purpose of this reorganization," Mr. Dezendorf announced, "is to provide a completely integrated facility for serving the requirements of our railroad customers on all matters of sales, service and parts, and to centralize the responsibility for continued customer satisfaction with our products in the same people who are responsible for the development of new business from those same customers.

"Complete facilities have now been provided at the New York Regional Office for serving all of the sales, service, and parts inquiries which may originate from customer railroads located in the Atlantic Seaboard area. In addition, warranty adjustments may be completed promptly and equitably upon inspection by our District Service Engineers. It is felt that by this means we can continue to improve our overall service and thus merit the continued fine cooperation and support we have had from you in the past."

Pullman Builds for Diesel Streamliners

CONSTRUCTION of the first of 60 modern railway cars, which will comprise the new "Empire Builder" trains with which the Great Northern Railway will serve America's Pacific Northwest, has begun at the Pullman-Standard Car Manufacturing Company plant. Delivery of trains is scheduled for the final quarter of 1946. Five trains will be constructed, one of which will be purchased by the Burlington, which operates Great Northern trains between Chicago and St. Paul-Minneapolis.

Part of the program of the nation's railroads to offer the most modern transportation in the world, the five trains will operate daily each way between Chicago and Pacific Northwest points. Powered by Diesel-electric locomotives the streamliners will operate on a 45-hour schedule between Chicago and Seattle, approximately 13½ hours faster than at present.

Each train will consist of a combination mail and baggage car, four coaches, a lounge-grill car, one diner, four sleeping cars, and an observation-lounge car. Two of the sleeping cars will have eight duplex-roomettes, four bedrooms and four open sections each. The other two sleeping cars will have 16 duplex-roomettes and four bedrooms each. The observation-lounge car will include two bedrooms and a drawing room.

Alco Appoints Edward J. Dudley

APPOINTMENT of Edward J. Dudley as public relations representative of the American Locomotive Company at Schenectady has been announced by Lynn Mahan, assistant to the president in charge of public relations. Mr. Mahan said that Dudley's appointment completed a reorganization and expansion of American Locomotive's public relations activities, including advertising, publicity and sales promotion. Dudley will make his headquarters at Schenectady.

MARINE BUCKEYE STATIONARY DIESELS

POWER ECONOMY BUCKEYE

IT'S TIME NOW!

To decide on your New Diesel Engines

Buckeye Diesels are Engineered for Dependability, Economical Operation and Long Life

- Buckeye heavy-duty crankshafts are solid forgings of special steel which resists fatigue and crystallization.
- Buckeye cylinder liners are made of close-grained, extra hard nickel chromium alloy, and are water-cooled over their entire surface. These features have more than doubled the life of the liners.
- Reversible, shell-type, silver-alloy bearings — manufactured by a special Buckeye-developed process—will last, with proper care, for the life of the engine.

There are other major features that help produce dependable power at lower cost for Buckeye owners. Write for your Buckeye bulletins. Place your order NOW for early delivery.

Stationary and Marine Propulsion (Direct Reversing) Engines 150-*900 H.P.

Marine Auxiliary and Stationary Generator Sets 100-*600 KW

*Supercharged Ratings to 1440 HP and 1000 KW

"Be Profit-Wise and Dieselize with Buckeyes"

THE BUCKEYE MACHINE CO., LIMA, OHIO

• ENGINE BUILDERS SINCE 1908 •

A COMPOSITE CATALOG OF THE ENTIRE DIESEL INDUSTRY

More than **300** *American-made Diesels described*

PROFUSELY ILLUSTRATED

ONLY A FEW COPIES LEFT!

Volume 10

THOUSANDS BUY THE DIESEL ENGINE CATALOG EACH YEAR — THOUSANDS MORE WILL WANT THIS TENTH EDITION BECAUSE THEY WILL NEED IT MORE THAN EVER, AND IT IS THE ONLY BOOK OF ITS KIND PUBLISHED. MAKE SURE YOU HAVE UP-TO-THE-MINUTE INFORMATION ON ALL THE NEW AND VITALLY IMPORTANT DIESEL DEVELOPMENTS — ORDER YOUR COPY OF THE DIESEL ENGINE CATALOG, VOLUME 10, TODAY.

$10

Here is the book you have been looking for — a book you need now and will use throughout the coming year. Not a book to read and lay aside — but one to which you will frequently refer; — Design and operating engineers, Diesel students, purchasing and sales executives — in fact all who are interested in Diesel engines, accessories and plant equipment, keep The DIESEL ENGINE CATALOG within reach all the time — because it is the Diesel "bible", a big book — 10⅛" x 13½" — 530 Pages and a really big value. Rex W. Wadman, editor, conceived the DIESEL ENGINE CATALOG as a "Cross Section of The Diesel Industry" — just that; and through ten consecutive editions the book has been greatly expanded each year to keep pace with the rapid growth of the Industry. This 10th edition, the largest and most complete of all, carries descriptions of more than 300 American-made Diesels with a large section devoted to Diesel engine accessories and plant equipment— a most useful and indispensable book.

USE THIS CONVENIENT COUPON

ORDER YOUR COPY *NOW*

DIESEL ENGINE CATALOG — Two West Forty-Fifth Street — New York 19, N. Y.
Enter my order today for a copy of the New Diesel Engine Catalog, Volume Ten, Edited by Rex W. Wadman, for which I enclose $10.00.

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Diesel engine

North Carolina State Offers Graduate and Non-Credit Diesel Courses

IN officially announcing the establishment of a new Department of Diesel and Internal Combustion Engineering at N. C. State College at Raleigh, N. C., Dean J. H. Lampe, head of the college's School of Engineering, says that "as a result of conferences and communications with representatives of Diesel engine manufacturers, emphasis is being placed on a graduate and research program, although the fundamental training needs are in no way being neglected. It is stated by the Diesel industry that in the years before the war and during the war they had to depend largely on Diesel designers and Diesel engineers who were educated in Europe.

"The outstanding need of the industry," said Dean Lampe, "is for full-fledged Diesel engineers and designers. Such men must be fully educated and trained in the fundamental fields of mechanical engineering and then continue their training and education further in the specialized field of Diesel engine design, development, etc. This specialized training can only be carried out through advanced courses in theory, design, experimental and research work in many phases of Diesel engineering.

"The Mechanical Engineering Department of State College will provide the fundamental undergraduate training for our design and operating engineers, but our new Department of Diesel and Internal Combustion Engines will offer the advanced program of theory design and research, which will train the specialists needed by the engine industries and others.

"In addition to its educational and research activity, the Department of Diesel Engineering will at all times cooperate with the Diesel engine industry by organizing and operating special service programs on a non-credit scholastic basis. These programs might be of an institute nature which will provide a means for scientists, engineers, and leaders to discuss improvements, developments and new applications, economic factors, etc.

"Another type of special program that might render a real service is one which would provide at an accelerated rate a review of technical advances in the Diesel engine field. Such a program would be of the refresher type and would be of particular value to the men who are now in industry or in the services.

"There would undoubtedly be other non-credit programs which could render a service to the Diesel engine industry, and certainly it will be the function of this department to organize these courses, which might vary in length from several days to several weeks.

"N. C. State College looks forward to the development of this program under the able leadership of Prof. Robert B. Rice, who has been so energetic and active in organizing this work on our campus. It is fully anticipated that in the near future the Diesel engine manufacturers will continue their interest in the Diesel program here at State College through the establishment of sponsored research and experimental work in the field of Diesel engineering.

"N. C. State College now has its first graduate students in this program, and is also operating its first short non-credit training program for Diesel engine operators."

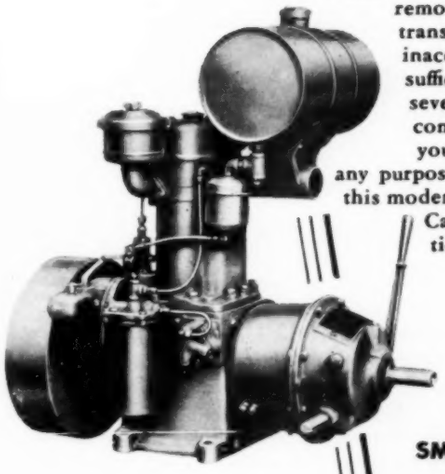
The laboratory of the new N. C. State College

The

OUTSTANDING ENGINE

IN THE SMALL POWER EQUIPMENT FIELD

The Hallett Full-Diesel Engine combines the most advanced Diesel engineering and developments for the production of efficient, economical, and dependable power, with the utmost simplicity in operation and maintenance. Built in stationary and marine types, it is adapted to all power purposes within its power range on land and sea. It is small and compact (30⅜" high x 24" wide over-all), making it easy to handle in close quarters. Built in three sections, with detachable cylinder and removable flywheel, it is readily transported to even the most inaccessible locations; and is sufficiently rugged for the most severe operating and service conditions in any locality. If you need a small power unit for any purpose, now or later, investigate this modern Full-Diesel prime mover. Catalog and detailed information supplied on request.



FULL-DIESEL

8 H. P. at 1500 r.p.m.

SMALL — RUGGED — COMPACT

HALLETT MANUFACTURING COMPANY

New York Detroit — INGLEWOOD, CALIFORNIA. U. S. A. — San Francisco Glendale

Cable Address: HALMFG — *Established 1916* — Code: Bentley's

HALLETT DIESEL ENGINE

department has one of the largest collections of Diesel engine in the world, with the equipment being valued at more than $2,000,000.

The college conducted a Navy Diesel Training School from Jan. 6, 1941 until Dec. 1, 1945, erecting a building to house the Navy equipment. The Navy now has agreed to allow the equipment to remain at the college for civilian training programs, but the equipment will be subject to be called by the Navy if needed.

Tube Turns Inc. Appoints California Manager

JACK GREEN, sales manager of the welding fittings division of Tube Turns, Inc., has announced the appointment of James H. Withers as district manager in charge of the firm's San Francisco and Los Angeles offices.

Prominently identified with the refinery equipment business throughout his career, Withers joined Tube Turns, Inc. in June, 1944.

Over two million MICHIANA Oil Filters and Elements have been made during the last 30 months.

This is equivalent to over a quarter billion horsepower capacity of gasoline and diesel engines.

Because a big part of this tremendous production was required for Army and Navy equipment, it was not possible at all times to supply adequately the civilian demands.

The added experience gained in meeting the exacting requirements of Army and Navy, and enlarged manufacturing facilities assure you still better filters in quantities to meet all your post-war needs. MICHIANA PRODUCTS CORPORATION, Michigan City, Indiana.

MICHIANA OIL FILTERS

For Ships, Tractors, Trucks, Buses, Agricultural Machinery, Construction and Road Building Equipment, Cars, Delivery Vehicles, and Stationary Engines—gas and diesel.

The New Haven Railroad Answers the Coal Shortage

NEW HAVEN R.R.

PASSENGER SERVICE

AS USUAL

The New Haven Railroad, because of its large number of Diesel Locomotive units, and because of the embargo on a portion of its freight service, is able to offer both its COMMUTERS and REGULAR passengers service AS USUAL. It is also able to accept freight for delivery at any station along its lines and for delivery over connecting roads with Diesel or electric service.

THE NEW HAVEN R.R.

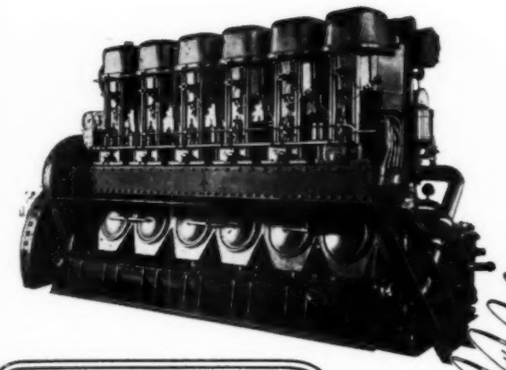
Serving New York and the great industrial and recreational States of Massachusetts, Rhode Island and Connecticut.

THE above ad reproduced from the May 10th edition of the New York Herald Tribune was a welcome sight to travelers and shippers worried about transportation during the recent coal strike. As other railroads cut schedules drastically to conserve fuel the Dieselized New York, New Haven and Hartford Railroad was not affected. By re-shuffling their Diesel locomotives and by indoctrinating a few steam men in the wonders of Diesel-electric operation the problem was solved.

Moral—If You Can't Find a Job, Make One

AN unusual success story involving two recent Bailey Diesel School graduates came to light recently. Upon completion of their training, the pair headed for Detroit where opportunities seemed bright for Diesel-skilled engineers. The venturesome duo, one of whom was John B. Buffington of St. Louis, made the rounds of potential Diesel employers not too successfully. On the verge of utter discouragement, they happened on an operator of a mail boat on the lakes who was having considerable engine trouble. Buffington and his pal convinced Mr. Owner that they could get his vessel fixed pronto if he'd provide necessary spare parts. After ten days work, the vessel was ready for sea again.

Here's the success story climax—the ship owner, an affluent and energetic Detroit business man, saw in this pair of Bailey grads the material of good Diesel men. And so—after May 1—if you're in the vicinity of the foot of DuBois Street, Detroit, you'll find Buffington and his pal in the Marine Repair Service business—with their "angel" the Detroiter whose mail boat the boys fixed up while looking for a job.



A Diesel Is No Better Than Its Cooling System

So Aerofin Is the Designer's Choice . . .

HIGHLY EFFICIENT
— metallic bonding and complete tinning give highest practical heat transfer

DURABLE
— high quality materials and close inspections assure long life

ADAPTABLE
— compact, light weight units easy to install in small space

ENGINEERED
— our experienced staff fits the right equipment to your needs

EASILY SERVICED
— removable headers for easy cleaning where required

DEPENDABLE RATINGS
— tables and charts nationally known for accuracy

Specializing in
COILS...
Nothing else.
Aerofin is good insurance against expensive mistakes

AEROFIN CORPORATION
402 South Geddes Street
Syracuse 4, N. Y.

Centrifugally Cast
DIESEL CYLINDER LINERS

CENTRIFUGALLY CAST DIESEL CYLINDER LINERS by JANNEY are furnished in the completely finished condition ready for immediate installation. Liners are produced under the closest of scientific and laboratory controls. Our facilities for production of liners having I.D's ranging between 8" and 14" are exceptionally adequate. We stress that all liners must be void of "free ferrite" which is a most energetic source of scoring. Liners can be furnished with the PORUS-KROME* treatment. Our technical staff is at your service supplemented by our many years experience in cast iron metallurgy.

*Van der Horst

JANNEY CYLINDER COMPANY
7428 STATE ROAD, PHILADELPHIA 36, PA.

Film On Compressed Air Available

"OUR Industrial Air Power" is the title of a new educational film on the many industrial uses of compressed air which is available for showing before students, engineering societies and other groups. Among the sequences contained in this 25 minute, 16mm sound-color film are: "Fundamentals of Air Compression," "Properties of Compressed Air," "How Different Types of Compressors Work" and "How Compressed Air is Used."

The film is available without charge on a loan basis. Write: Quincy Compressor Co., Quincy, Illinois.

Taylor Instrument Co. Appoints N. B. Nichols

THE Taylor Instrument Companies recently announced the appointment of N. B. Nichols as Director of its Research Division. He succeeds Dr. H. L. Mason who resigned to accept the professorship of Mechanical Engineering at Iowa State College, Ames, Iowa. Mr. Nichols has, for the past four years, been associated with the Radiation Laboratory, Cambridge, Mass., a subsidiary of the Massachusetts Institute of Technology, where he was in charge of a group that pioneered in developing numerous mechanisms required in automatic gunfire control.

N. B. Nichols

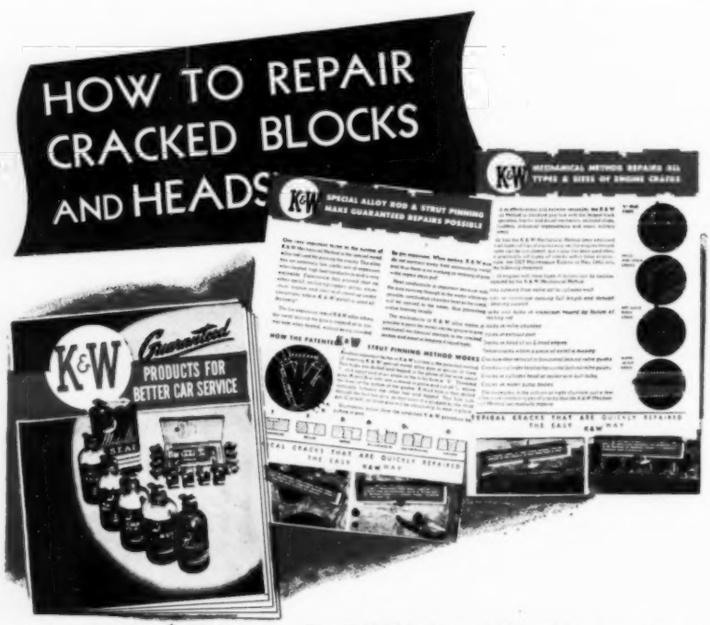
After completing his undergraduate studies at Central Michigan College of Education, Mt. Pleasant, Michigan, Mr. Nichols did three years of graduate work in physics at the University of Michigan.

Before the war Mr. Nichols spent two years with the Taylor Research Division and his ability as an aggressive scientist was recognized. His further demonstration of ability and leadership at the Radiation Laboratory, plus the valuable experience and acquaintances made there, resulted in his selection to head the Research Division.

Fred L. Manton Joins G. M. Diesel Oil Field Staff

FRED L. MANTON has joined the General Motors Petroleum Industry Sales staff, as announced by V. C. Genn, General Sales Manager of the General Motors Detroit Diesel Engine Division.

Fred L. Manton



Send For This Free Book

with the special illustrated section devoted to the "how" and "why" of the patented

K&W MECHANICAL METHOD

—the efficient, low cost way for repairing cracked engine heads and blocks. Keep up to date on engine repairs, use K & W Mechanical Method—the guaranteed method that saves important time and money in restoring cracked automotive and diesel engines to unimpaired service.

Use this COUPON

The K&W Mechanical Method has long been used by leading engine rebuilders, fleet operators, railroads and military repair centers to slash costs on cracked engine repairs. Proof of the effectiveness of the K & W Mechanical Method is this statement from ODT Report 5-1120: "There is no record of a repair failing as a result of time or mileage."

The K & W Mechanical Method and other K & W products are nationally advertised in Liberty, Popular Science and Popular Mechanics magazines.

Kerkling & Co., Burbank, California
Send me the K & W Catalog:

Name.....

Address.....

City..... State.....
H Zone

Mr. Manton was with the National Supply Company until recently. With General Motors Mr. Manton will be District Manager for the Detroit Diesel Engine Division Petroleum Sales in north and west Texas, northern Louisiana and Mississippi.

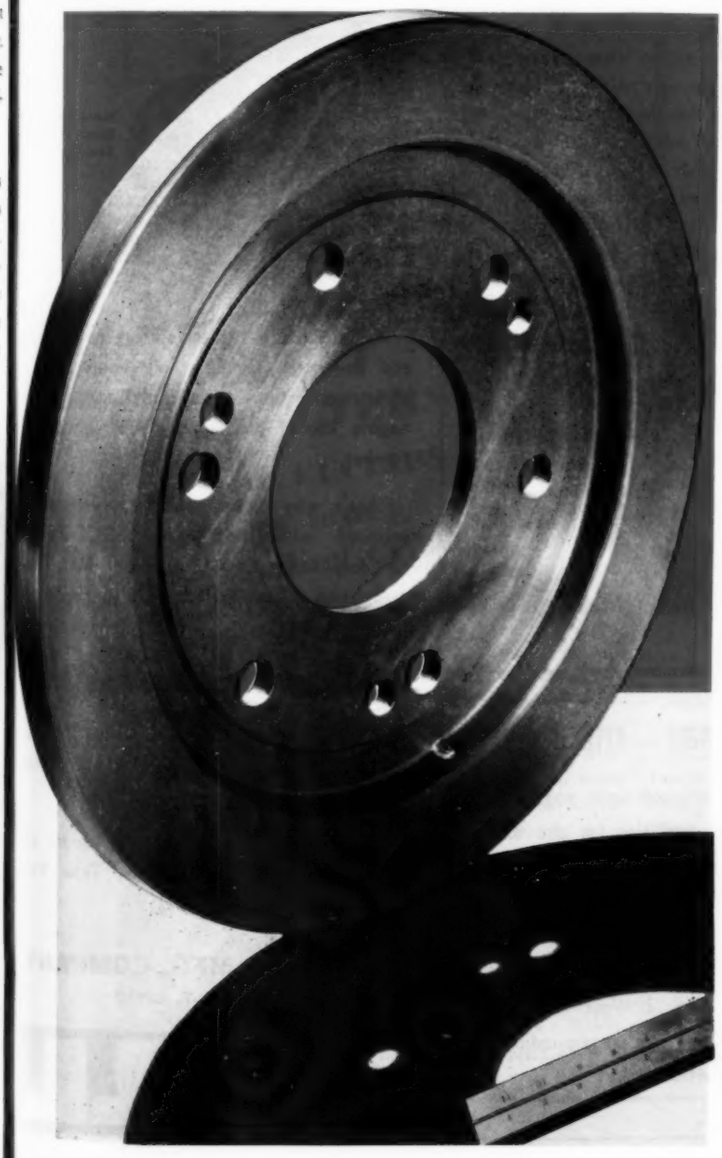
Santa Fe Annual Report Contains Interesting Diesel Facts

THE annual report of the Atchison, Topeka and Santa Fe Railroad Company recently issued, contains some interesting facts on its Diesel road locomotive operation. As of January 1, 1946 Santa Fe had a total of 239 Diesel locomotives comprising 448 integral power units. These locomotives in 1945 piled up a total of 16,372,197 freight, passenger and switching miles at a fuel cost of 19 cents per mile, a figure well under the average for coal and oil burning steam locomotives which cost an average of 38 and 32 cents respectively. During the year 1945, the company added 40 Diesel-electric locomotives to their motive equipment and only one new steam locomotive. However, ten used steam locomotives were purchased to alleviate the unprecedented wartime transportation load. At present, there are 8 Diesel road locomotives on order and no steam powered engines.

The 239 Diesel locomotives ran up a total of 16,372,197 miles as compared with the 78,485,129 miles garnered by the 1,571 steam locomotives. These figures show that the Diesels operated proportionately more than the steam locomotives and when it is further considered that the load hauling capacity of the Diesels is twice that of the average steam locomotive, we can safely say that they handled proportionately more tonnage.

1945 Diesel Progress Editorial Index Available

A COMPLETE Editorial Index of all issues of DIESEL PROGRESS published in 1945, including an Authors Index as well, has been made up in a 10-page, 8½ in. x 11 in. folder and is now available for distribution. A copy of the Index will be mailed, without charge, to all individuals requesting it on their letterhead. Address your request for the 1945 DIESEL PROGRESS Editorial Index to DIESEL PROGRESS, 2 West 45th Street, New York 19.



The HOUDAILLE*

VISCOUS TORSIONAL VIBRATION DAMPER

- *Dependable and Efficient*
- *Simple and Practical*
- *Usable Size and Weight*

● The Houdaille* Viscous Torsional Vibration Damper is extremely simple, consisting of only two essential parts...the damper mass or flywheel and the two-piece welded housing. Yet extensive tests have proven that on large engines or small...and on gasoline or diesel ...it damps BOTH major and minor critical orders of vibration more efficiently than any other device.

The Damper employs the new Silicone fluid with its relatively flat viscosity curve, so that efficiency is unimpaired by temperature ranges or changes. There are no wearing parts...no service necessary during the life of the engine since the fluid is hermetically sealed in the housing.

A Houdaille* Viscous Torsional Vibration Damper can be designed for any engine. Dimensions of individual design may be varied within broad limits to meet individual space limitations.

An exclusive development of Houde Engineering Division...patents pending.

HOUDE ENGINEERING DIVISION OF
HOUDAILLE-HERSHEY CORPORATION
MAKERS OF HYDRAULIC CONTROLS
BUFFALO 11, NEW YORK

*Pronounced—Hoo-dye

RITCO

DIESEL ENGINE PARTS

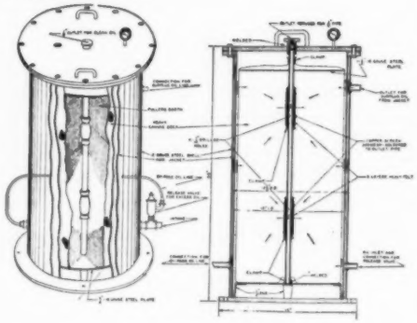
• DEPENDABLE
• ACCURATE

RITCO's complete facilities for machining and testing assure superior quality and accuracy in Diesel engine bolts, studs and other parts.

Remember RITCO *for*
SPECIAL BOLTS, NUTS AND STUDS
DROP FORGING • HEAT TREATING
DIESEL ENGINE BOLTS and STUDS
MILLED BODY BOLTS
Let us quote on your specifications.

RHODE ISLAND TOOL CO.
148 West River St., P. O. Box 1516
Providence 1, R. I.
SERVING AMERICAN INDUSTRY SINCE 1834

Sun Dual-Flow Lube and Fuel Filters



The Sun "Dual Flow" Oil Filter

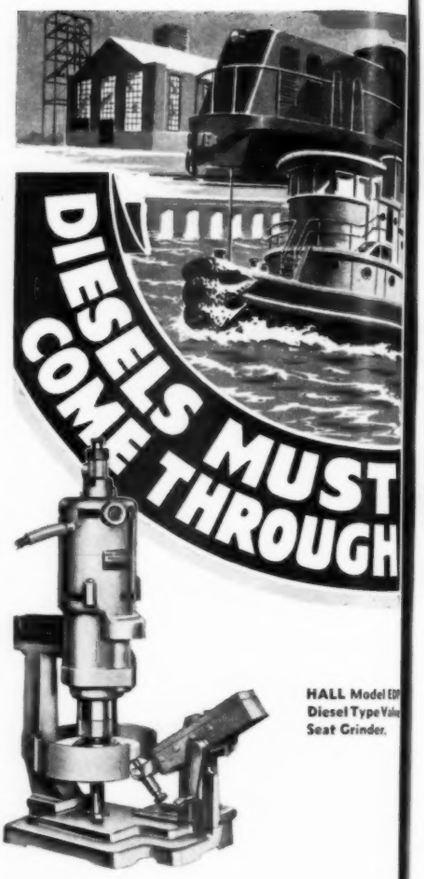
W. L. CLAY, manufacturer, announces The Sun line of lube and fuel oil filters embodying what is termed a "Simultaneous or Dual Flow" principle in which both fuel and lube are continuously and simultaneously filtered and, at the same time, the lube oil entering the filter at crankcase temperature gives up its heat to preheat the fuel oil as the latter is being filtered. The unit thus acts also as a lube oil cooler. It is claimed that the Sun filter does not remove additives and inhibitors from lube oil. This interesting new development in oil filters is offered in capacities suitable for Diesel engines ranging from 5 to 400 hp. A bulletin describing the Sun Oil Filter will be mailed upon request to W. L. Clay, manufacturer, 1529 West Main Street, Oklahoma City, Oklahoma.

Illinois Auto Electric Official Declares The War Over

JOE SIROTEK, Sr., of Illinois Auto Electric Company, Chicago, considers the war as officially over now that all three of his sons have been released from the Armed Forces. The last to come home is Major Robert Lee Sirotek after three years in England and Germany with the Eighth and Ninth Air Forces.

MANUFACTURERS — ATTENTION!

A group of competent sales engineers are establishing facilities for the distribution of engineering products on the West Coast. Reputable manufacturers seeking representation in this area are invited to write: Box 161, DIESEL PROGRESS, 2 West 45th St., New York 19, N. Y. All correspondence held strictly confidential.



HALL Model EDI Diesel Type Valve Seat Grinder.

Ashore or afloat, diesels are expected to—and do—come through long hours of continuous operation—often under conditions no engine should be expected to successfully combat.

That's why diesel valve seats should be serviced with this HALL ECCENTRIC Grinder, designed to provide fast, easy restoration of original factory precision and finish.

Removing only enough of the valuable seat surface—hardened by heat and the continual hammering of the valve—it provides a round, true seat that requires re-servicing less frequently.

Complete information on the Model EDI Seat Grinder and HALL Wet Type Valve Refacer awaits your request.

THE HALL MFG. COMPANY
TOLEDO 7, OHIO

HALL

"FIXED-READING"

PREMAX

MODEL YRF

ENGINE PRESSURE INDICATOR

for DIRECT-READING OF COMPRESSION AND FIRING PRESSURES OF EVERY TYPE OF DIESEL ENGINE

ONE OF THE FEATURES Responsible for Its Overwhelming Preference by Leading Diesel Manufacturers and Operators

Spring-balance principle assures lastingly dependable service. No field adjustments or settings are required to take care of gauge drifting, or to compensate for other instrument characteristics and engine conditions.

For other features, write for Bulletin 294

ACCURATE PRESSURE READINGS as high as 1700 P.S.I.

BACHARACH

INDUSTRIAL INSTRUMENT CO.

7009 BENNETT STREET • PITTSBURGH 8, PA.

A Little

GAMLENOL

MAKES THIS

BIG *Difference*

IN FUEL OIL

Untreated oil readily reacts with water to form an emulsion, or sludge.

Gamlenol-treated oil does not combine with water; sludge formation is prevented.

POUR a comparatively small amount of Gamlenol into the fuel tank, through fill line or sounding pipe. The effect is immediately noticeable, for Gamlenol dissolves sludge throughout the system, clearing lines, coils, preheaters, strainers, injectors, burner tips. And, its regular use in small quantities prevents re-accumulations. Gamlenol greatly improves atomization and combustion, and increases firing efficiency, which results in more heat and power from every gallon of oil.

Gamlenol is safe, non-explosive, approved as ships' stores. It contains no acid, soda ash, caustic soda, or alkalis.

Ask nearest Gamlen representative for details, or write for Bulletin 455

GAMLEN CHEMICAL COMPANY

1469 Spring Garden Avenue—Pittsburgh 12, Pa.
195 San Bruno Avenue—San Francisco 3, Calif.
11 Broadway—New York 4, N. Y.

● Service and Stocks in All Principal Cities and Ports

NUGENT FILTERS

help EUCLIDS to lower Hauling Costs

NUGENT TRADE MARK

EUCLID heavy duty earth moving equipment has gained an enviable reputation for dependable hauling at low cost. Helping to keep engines at top efficiency are Nugent Filters, installed on many Euclids to protect moving parts against harmful dust and dirt.

This is just one example of the way in which modern Nugent Filters are used throughout industry wherever valuable machinery is to be kept at maximum efficiency with minimum time out for repairs. Let Nugent engineers help you in solving filtration or lubrication problems. Write today.

FIG. 1116 PY•D

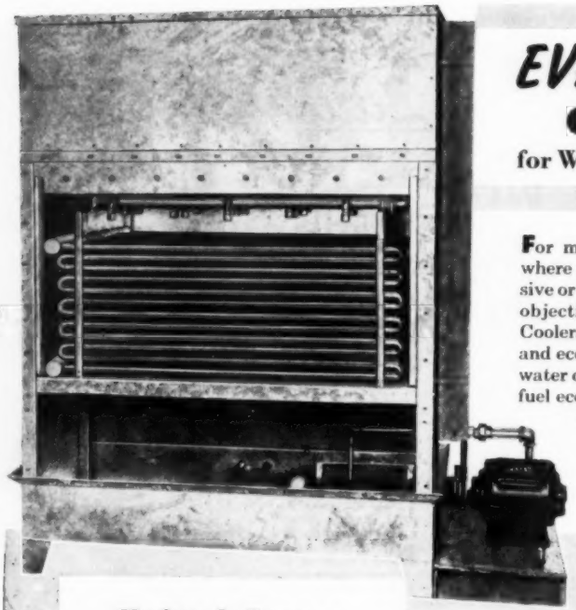
Nugent Filters

ESTABLISHED 1897

WM. W. NUGENT & CO., INC.

415 N. Hermitage Ave. Chicago 22, Illinois

Fuel Oil Filters
Lube Oil Filters
Lubricating Systems
Sight Flow Indicators
Oiling Devices



EVAPORATIVE COOLERS
for Water Saving Economy

For many diesel engine installations, where cooling water is scarce or expensive or the installation of a cooling tower objectionable, USAIRCO Evaporative Coolers provide a highly satisfactory and economical means of cooling jacket water or lubricating oil. You get greater fuel economy, because water and lubricating oil are always at same temperature. USAIRCO Evaporative Coolers are space savers, too—simplifying piping systems.

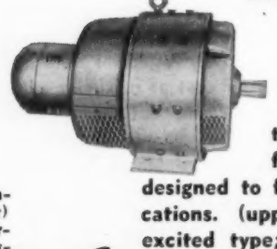
United States Air Conditioning Corporation
Minneapolis 14, Minnesota

OTHER PRODUCTS
COOLING & HEATING COILS • AIR WASHERS
BLOWERS • FANS • UNIT HEATERS
AIR CONDITIONING UNITS

FACTORY REPRESENTATIVES IN PRINCIPAL CITIES

GENERATORS AC and DC

Well-known for their rugged design, efficient performance, long life and minimum maintenance, whether powered by electric, gasoline, or Diesel equipment. Backed by over ½ century of manufacturing and designing experience, Kurz and Root generators are now serving industries throughout the world.



DC generator (left) two - bearings, self excited type. Can also be furnished with direct connected exciter. Both AC and DC generators can be furnished in the single bearing, flange-mounted type for special mounting requirements. Ball bearing construction is used throughout. Complete data upon request.

Illustrated are AC generators, only 2 of the many different types developed and designed to fit specific needs and applications. (upper left) two-bearing self-excited type; (lower right) two-bearing, direct connected exciter type.

AC-DC GENERATORS
KURZ and ROOT Company
Since 1898
APPLETON • WISCONSIN
.....and DC motors and motor generator sets

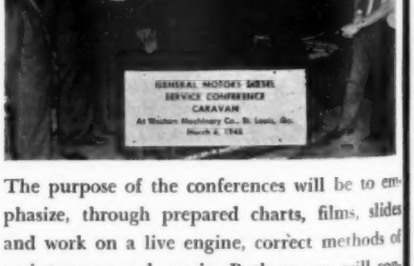
New Catalog Explains Electrical Instruments

THE Burlington Instrument Company, manufacturers of panel instruments, voltage regulators, automatic synchronizers, frequency regulators, and other control equipment has just announced the release of a completely new Burlington meter catalog that fully describes and illustrates all Burlington indicating instruments and auxiliary equipment. This new catalog features a detailed illustration of the Burlington precision movement together with a complete explanation of operating advantages, dimensional drawings and panel layouts for each Burlington model, as well as, ranges, scale division, resistance, and list prices.

Write today for your free copy of this new Burlington catalog, No. 46. Address your request to the Burlington Instrument Company, Box No. 589, Burlington, Iowa.

General Motors Corporation Conducts Nationwide Diesel Service Conferences

TWO caravans left Detroit Diesel Engine Division, General Motors Corporation, recently to conduct conferences on service and maintenance in all parts of the country. After a joint stop at the Western Machinery Company, General Motors distributors in St. Louis, Missouri, the two groups will separate, one going to the West Coast and one traveling through the South and East, visiting distributors of General Motors Diesel industrial and marine engines. Their itinerary will cover a total of over 12,000 miles.



The purpose of the conferences will be to emphasize, through prepared charts, films, slides and work on a live engine, correct methods of maintenance and repair. Both groups will conduct one conference each week in a strategically located city, which will be attended by representatives from several General Motors distributors in a radius of 50 to 300 miles.

This is the first postwar tour of General Motors Diesel Service Instructors, but it is planned to

continue such training indefinitely, utilizing special Diesel-engined transports as soon as such units are available.

Committees Appointed to Improve Diesel Fuel

E. J. SCHWANHAUSSER, President of Diesel Engine Manufacturers Association, has announced that the following men in the Diesel engine industry will cooperate with a committee from the oil industry in a program aimed to improve fuel performance in Diesel engines.

J. W. Linford, American Locomotive Company; C. B. Hoffman, Atlas Imperial Diesel Engine Co.; G. N. Guerasimoff, The Buda Company; Ralph Jackson, Busch-Sulzer Bros.-Diesel Engine Co.; P. L. Callan, Chicago Pneumatic Tool Company; Ralph Boyer, The Cooper-Bessemer Corporation; H. L. Knudsen, Cummins Engine Company, and T. M. Robie and L. D. Thompson, Fairbanks, Morse & Co.

R. C. MacKinnon, Fulton Iron Works Co.; Paul Shirley, General Machinery Corporation; H. M. Gadebusch, Detroit Diesel Engine Division, General Motors Corp.; O. D. Treiber, Hercules Motors Corporation; H. F. Bryan, International Harvester Company, and Walter F. Lathrop, The Lathrop Engine Co.

Earl McMahon, Lister-Blackstone, Inc.; William M. Walworth, Mack Trucks, Inc.; Robert Cramer, Nordberg Manufacturing Co.; Frank Peacock, Sterling Engine Company; J. H. G. McConechy, Sun Shipbuilding and Dry Dock Co. and J. C. Barnaby, Worthington Pump and Machinery Corporation.

The program of research will be conducted by the Automotive Diesel Fuels Division of the Coordinating Fuels Research Committee, which is a part of the Coordinating Research Council. The Council is sustained by the American Petroleum Institute and the Society of Automotive Engineers.

Personnel of the Automotive Diesel Fuels Division is as follows:

Dr. D. P. Barnard, Standard Oil Co. (Ind.), chairman; Harold M. Smith, Bureau of Mines; Capt. W. C. Latrobe, U. S. Navy; C. B. Veal, Coordinating Research Council; C. D. Lowry, Jr. and J. S. Bogen, Universal Oil Products Co.; Walter G. Ainsley, Sinclair Refining Co.; John C. Day, Western Petroleum Refiners Association; Comm. Norman H. Hall, U. S. Coast Guard, and Mr. Robie and Mr. Thompson.

Skilled operation and diversified equipment, backed by 85 years of wide experience, enable Moran to carry out towing assignments, whether harbor, inland, coastwise or deep sea . . . with dispatch.

MORAN

Established 1860

TOWING & TRANSPORTATION

New York • New Orleans • San Francisco

Here's why THOMPSON DIESEL ENGINE VALVES CUT MAINTENANCE COSTS!

IF YOU operate any stationary or mobile diesel equipment—from the smallest industrial engine to the largest, in any kind of service—you can increase engine efficiency, extend time between overhauls and cut your maintenance expense with Thompson Valves, Seats and Guides.

THE REASON IS THIS: Thompson Valves are made by a hot-forging process from steels especially developed for valve use—"Fercrome L" stainless steel for the valve head, chrome nickel for the stem. These two steels combine to give you a valve that is free from oxidation, scaling and corrosion to 2000° F, has high ultimate strength values at high temperatures, and maintains perfect alignment for efficient valve operation. **Result: Continuous smooth operation at peak loads and under the most severe service conditions!**

Thompson Valves, Seats and Guides are standard equipment in **most** of the leading diesel engines manufactured . . . proof of the quality, long life and trouble-free service built into them. **In the original engines you buy . . . and for replacement needs in your present equipment—make sure you specify Thompson!**

SEND FOR THIS BOOKLET—Here's helpful information your mechanics and maintenance engineers can use to increase the service life of diesel engine valves, seats and guides. Contains non-technical data on engine valve installation and maintenance . . . facts gleaned from over 40 years experience in this field. Your copy will be mailed without obligation—write today.

Thompson Products, Inc.

WEST COAST PLANT • BELL, CALIFORNIA

REVERSING DRIVE SHAFTS CALL FOR TUTHILL MODEL R

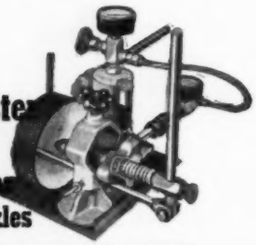
Let This Automatic Reversing Pump Solve Your Problems

Without the use of check valves and without changing the direction of flow of the pumpage, Tuthill Model R Automatic Reversing Pumps solve the problem of driving the pump from a reversing shaft. They provide the economical pumping equipment for use where the ultimate direction of shaft rotation is not known. These internal-gear rotary pumps are ideal for lubrication, coolant or liquid transfer service. Capacities from 1 to 50 g.p.m. and pressures up to 100 p.s.i. Available with or without internal-relieving feature. Also in stripped model form. Write for Tuthill Reversing Pump bulletin.

TUTHILL PUMP COMPANY
939 EAST 95th STREET • CHICAGO 19, ILLINOIS

BUDA NOZZLE TESTERS

One Nozzle Tester for all Standard Types of Diesel Nozzles



Write for Bulletin No. 1170
THE BUDA COMPANY
1542 Commercial Avenue
Harvey (Chicago Suburb) Illinois

WEST COAST DIESEL NEWS

By FRED M. BURT

CONSOLIDATED Steel Corp., of Newport Beach, California, is building two 125-ft. steel tuna clippers, each powered with 850-hp. Atlas Imperial supercharged Diesels. The *American Boy* will have 200 hp. and 120 hp. Atlas auxiliaries; the *Conte Bianco* 200 and 145 hp. Atlas auxiliaries.

THE *SOVEREIGN,* $130,000, 82-ft. shrimp fishing craft, completed by J. M. Martican Shipbuilding Co., Tacoma, for J. H. Pullen of Houma, Louisiana, is powered with an Enterprise Diesel.

THE $450,000, 500 ton steel tuna clipper *Sun Dial,* 131 ft. long, 31 ft. beam, 17 ft. depth, logged 11.7 knots on her trial trip. With the largest carrying capacity of any ship in the San Diego tuna fleet, the *Sun Dial* is propelled by a DMG 38, 8-cyl., 4-cycle, supercharged Enterprise Diesel of 850 hp. Three 6-cyl. Atlas, 112 hp. Diesel auxiliaries are connected to 75 kw. Fairbanks-Morse a.c. generators and supply ships service power.

THE 83-ft. sardine fishing boat *Voyager* of Gig Harbor, Washington, is powered by an Enterprise Diesel of 400 hp. at 400 rpm. Trials gave 12 knots light, and 11 knots when loaded with sardines.

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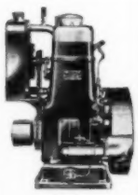

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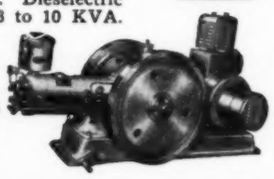

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CATERPILLAR Marine Diesels supplied by the Interstate Tractor & Equipment Co. of Astoria, Oregon, will be used in the otter trolling and tuna fishermen, *Sea Lion III*, towboat *Sonja*, and tuna fisherman *M. C. Lassie*.

JACK CREVELLO, President Sun Harbor Packing Co., San Diego, announces that they are ordering two 112 ft. tuna clippers at a cost of $375,000. These will be powered by two 300 hp. Diesels with two 125 hp. Diesel auxiliaries. These boats will be built by Pacific Boatbuilding Co., Tacoma. A third clipper is to be a 97 ft. wooden boat.

THE Diesel-engined tuna clipper *Pan-American* owned by Tony Martinolich, is the first Pacific Coast fishing vessel to have a radar installation. The sale was made by Amile J. Forni of San Francisco for the Raytheon Mfg. Co.

PURSE seiner *Commander*, 81 ft. long, is driven by a 240 hp. Washington Diesel, and now has a D4600, 65 hp. Caterpillar for auxiliary. It has just received a Kohlenberger chilling system.

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Four only 600 HP brand new Washington Iron Works 8-cylinder 277 RPM direct reversible Marine Diesel engines with accessories and spare parts.

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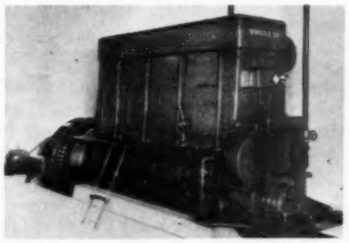

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375 HP Fairbanks	8 cyl.	300 KVA	3/60/3600	1938
300 HP Fairbanks	8 cyl.	300 KVA	3/60/3600	1938
300 HP G. M. Winton	6 cyl.	200 KVA	3/60/360	1937
250 HP Buckeye	7 cyl.	210 KVA	3/60/3600	1938
225 HP Buckeye	8 cyl.	187 KVA	3/60/600	1941
187 HP Buckeye	6 cyl.	150 KVA	3/60/360	1937
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er from a pair of 200 hp. 6-cyl. Atlas-Imperial Diesels direct connected to 156 kva. Fairbanks-Morse generators.

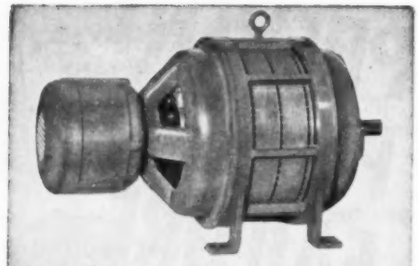
BUILT for Harry Ogilvie and associates to fish for San Diego Packing Co., the *Kitty Hawk,* a 131 ft. tuna clipper, which will pack about 300 tons, is driven by an 840 hp. Superior Diesel. The auxiliaries are also Superiors, two 200 hp., driving 156 kva. Fairbanks-Morse generators. Refrigeration is by Kohlenberger.

THE new steel tuna clipper, *Pico,* built by National Iron Wks., on the trial run, powered by a 200 hp. 8-cyl. Lorimer Diesel, made nine knots. Auxiliaries are two 60 hp. 4-cyl. Lorimers.

AFTER very successful operation of the York Freon refrigeration system on the San Pedro purse seiner *El Padre,* numerous other York systems have been installed at Fish Harbor on tuna vessels. The *El Padre* gets its refrigerating power from a D4400 35 hp. Caterpillar Diesel.

THE *America 4,* a 45 ft. albacore boat operating out of San Pedro, owned by M. Taramaria and his brother has been given a new propulsion unit in the form of a 60 hp. Atlas-Imperial Diesel.

NEW engine installations by the Western Boat Building Co. of Tacoma, Washington, in commercial fishing boats include: the *Western Mon-*



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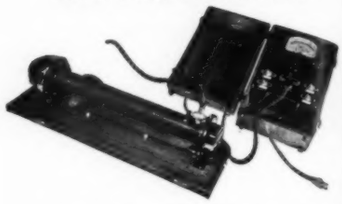

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arch, a 70 hp. Atlas auxiliary, and the salmon seiner *Waterland,* a new D13000 Caterpillar Diesel.

THE Richmond (California) Navigation Company's 36 year old tug, which operated for 20 years with the 80 hp. Atlas No. 8001, the second Diesel engine Atlas built, is now powered with a D-17000, 135 hp. Caterpillar Diesel.

THE *Julia B,* a wooden tuna clipper built by Lynch Shipbuilding Co., San Diego, is a new 103 ft. vessel propelled by a Monel DMG Enterprise Diesel, 400 hp. 6 cyl., auxiliary power is supplied by a pair of 5 cyl. Lorimer Diesels of 125 hp. driving 75 kw. generators.

THREE 275 hp. 6 cyl. supercharged Cummins Diesels drive the *Sport King,* a modernistic, sport fishing cruiser at 20 knots. The Diesels turn 2100 rpm. at top speed. This new craft under construction at Wilmington, Calif., will render service to Southern Californian fishermen.

TWO new 112 ft. steel tuna clippers being built by John Breskovich's Pacific Boat Building Co., Tacoma, use twin screws for propulsion. Power will come from two 320 hp. Washington Diesel engines.

A 70 ft. tuna tender for Sun Harbor Packing Co. of San Diego, will be powered by two dual General Motors Diesel marine units developing 330 hp. each. For auxiliary use, the tender will carry a General Motors Diesel engine developing 20 kw.

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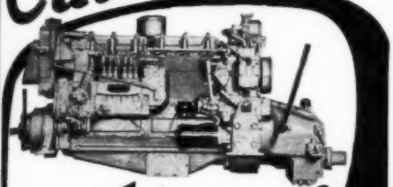

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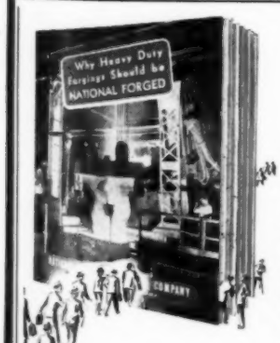

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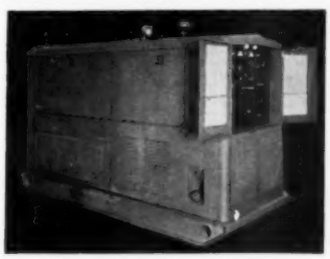

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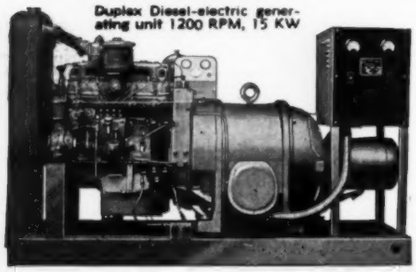

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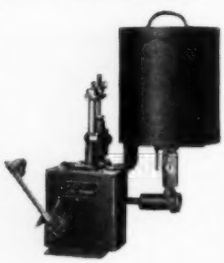

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